



**ADDIS ABABA UNIVERSITY
COLLEGE OF TECHNOLOGY AND BUILT ENVIRONMENT
SCHOOL OF BUILT ENVIRONMENT
DEPARTMENT OF URBAN AND REGIONAL PLANNING**

**THE IMPACTS OF MIXED LAND USE PLANNING ON SOCIO-ECONOMIC,
PHYSICAL AND ENVIRONMENTAL DEVELOPMENT:
IN ADDIS ABABA, THE CASE OF MCC, MC, SC AND AGJ.**

BY:

GIRMACHEW TARIKU JENOLLO

**JUNE, 2025
ADDIS ABABA, ETHIOPIA**

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**A DISSERTATION SUBMITTED TO THE DEPARTMENT OF URBAN AND
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DECLARATION

I, the undersigned, declare that this is my original work, has never been presented at any other university, and that all the resources and materials used for the dissertation have been duly acknowledged.

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DISSERTATION APPROVAL

This is to certify that the dissertation prepared by Girmachew Tariku Jinollo, entitled: “The Impact of Mixed Land Use Planning on Socio-economic, Physical and Environmental Development in Kir-kos and Bole sub city, In Addis Ababa, The Case of MCC, MC, SC and AGJ.” Submitted in fulfilment of the requirements for the Degree of Doctor of Philosophy in Urban and Regional Planning, this dissertation complies with the university’s regulations and meets the accepted standards concerning originality and quality.

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ABSTRACT

This study investigates the impact of Mixed Land Use Planning (MLUP) on socio-economic, physical, and environmental (SEPE) development in Kir-kos and Bole sub-cities of Addis Ababa, Ethiopia, with particular reference to MCC, MC, SC, and AGJ neighborhoods. The research addresses four key aims: (1) assessing the spatial pattern of urban functions and their influence on land-use patterns, (2) judging urban planners' and stakeholders' view regarding the effectiveness of MLUP in sustainable development, (3) investigating SEPE effects, particularly socio-economic equity, infrastructure, and environmental sustainability, and (4) ascertaining root causes of implementation problems of MLUP, including policy gaps, governance issues, and socio-economic inequalities. Using a mixed-methods approach, the study integrates qualitative interviews with 14 key informants (planners and officials) and 40 planning practitioners with quantitative surveys of 384 households in the four neighborhoods of study. GIS analysis, stakeholder perceptions, and field observation for the planning decade 2002–2017 were synthesized. Findings indicate clustered land-use patterns ($\chi^2=47.763$), disproving spatial randomness, with MLUP increasing accessibility but showing uneven socio-economic benefits. While planners endorsed MLUP potential, residents were dissatisfied with economic outcomes, regulatory ambiguities, and transport inefficiencies—citing overuse of taxis. The study concludes that effective regulatory mechanisms, synchronized transport planning, and stakeholder coordination are required for optimal MLUP attainment to maximize SEPE impacts. Among the recommendations are context-sensitive zoning, policy coherence, and community participation to enhance sustainable urban growth. Future research must examine longitudinal MLUP impacts and equity dimensions in rapidly urbanizing African cities.

Keywords: Mixed land use, urban planning, socio-economic development, sustainable cities, Addis Ababa

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LIST OF ACRONYMS AND ABBREVIATIONS

AACPPO	Addis Ababa City Planning Project Office
AAMP	Addis Ababa Master Plan
AAMPPO	Addis Ababa Master Plan Project Office
ECSU	Ethiopia Civil Service University
GST	General System Theory
ISD	Industry Survey Definition
LUM	Land-use Mix
ML	Mixed Land-use
MLUP	Mixed Land-use Planning
MUD	Mixed-use Development
MWUD	Ministry of Works and Urban Development
NUA	New Urban Agenda
NDP	National Development Plan
ORAAMP	Office for Revision of Addis Ababa Master Plan
SDFs	Spatial Development Frameworks
SPAA	Structural Plan of Addis Ababa
SSA	Sub-Saharan Africa
ULI	Urban Land Institute
ULLHP	Urban Lands Lease Holding Proclamation
ULM	Urban Land-use Mix
UMLP	Urban Mixed Land-use Planning
UPD	Urban Planning and Development

GLOSSARY OF TERMS

City: urban structures are the major determining spatial frames (streets, centers, green spaces, and main transportation axes) of a city that influence spatial growth as well as people's movement. (Sun et al., 2022).

Derg: the military government of Ethiopia in power from 1975–1991 (Kidanu, 1997).

Heterogeneity: is the quality of being diverse and not comparable in kind. (Dictionary of the English Language, 5th edition, 2016).

Homogeneity: is the quality of being uniform throughout in composition or structure. (Dictionary of the English Language, 5th edition, 2016).

Housing density is the number of residential housing units in a designated land area. (Jr & Davidson, 1996)

Kifle Ketema, which means "new town" in Amharic, replaced the term "woreda" and was used in conjunction with "sub-city." It is an administrated geographical area under the city government and is made up of many kebeles. (Kidanu, 1997)

Land use or expected to be used for urban activities. Its attributes include location, space, property, clustering, heterogeneity, immobility, and indestructibility. (<https://www.jstor.org/stable/3486582>)

Merkato is supposedly the largest open-air market on the African continent (Kebbede & Jacob, 1985).

Master plan is blueprint of the content and appearance of a site or place when it had been developed. Master planning was a management practice for managing the physical processes necessary for realizing the development of urban places (Waer, 2014), page 25 (Schéma directeur d'aménagement et d'urbanisme in French colonies).

Norm is a socially accepted rule or idea that is applied in detail to spatial planning. (Norms and Standards, p. 163)

Regulation is a rule or order of conduct prescribed by an authority, either requiring or prohibiting certain behavior for various purposes such as health, safety, or environmental objectives. (The Urban Housing Manual, p. 25) (Goodfellow, 2013).

Sefer is an Amharic word, in one of Ethiopia's language, which generally could be translated to mean neighborhood Fasil Giorghis and Denis Gerard the City and Its Architectural Heritage Addis Ababa 1886-1941 (Feleke et al., 2018)

Standard is a concept applied in spatial planning in a quantifiable SI unit of measurement that explains sufficiency in terms of space (distance, area) and compatibility (function, height), etc., in planning. Norms and Standards (Pages 163–4)

Urban Development is the social, cultural, economic, and physical development of cities and the underlying causes of these processes. (DFID Crown, 2016)
<https://gsdrc.org/topic-guides/urban-governance/key-definitions/>

Urban Environment is a human settlement with a high population density and built-environment infrastructure. (Student, 2015).

Urban Growth is an increase in the absolute size of an urban population. This could be at the level of an individual settlement or a collection of settlements (e.g., at the national level) (Goodfellow, 2013).

Urban Land refers to land located in a municipal area and the areas in its periphery that the state government may notify, with different limits of periphery areas notified for different classes of municipal areas (Rajasthan Land Revenue Act, 2003).

Wereda is an Amharic and/ or Tigrigna language refers to a kind of administrative structured by the federalism government system in suit of decentralization of power that have a population of 20, 000 and above in Ethiopian context (Feleke et al., 2018).

CHAPTR ONE

1.1 Background of the study

Mixed land use planning (MLUP) is a best approach that can encourage fair and sustainable urban growth by concentrating residential, commercial, cultural, and institutional activities within the same space. Urban vitality, walkability, and economic vitality are enhanced through this system (Allam et al., 2022b; Carpio-pinedo et al., 2021). However, its application is met with strict challenges in the Sc of rapidly developing cities where issue such as mixed land uses, urban sprawl, and inequalities in incomes are extremely common (Goetz, 2013; Knaap & Talen, 2005). The issues are even greater in the Global South, where conventional planning platforms do not respond well to the requirements of marginalized city crowds (Watson, 2009c). The resolution of these mismatches between institutionalized planned mechanisms and realities of urban poor life requires context-specific and inclusive solutions.

This research focuses on the impacts of MLUP on socio-economic, physical, and environmental (SEPE) development in Addis Ababa, Ethiopia, specifically in the Main City Center (MCC), Main Corridors (MC), Sub-Corridors (SC), and Around AGJ Junction (AGJ). By analyzing these regions, the research work intends to address significant gaps in understanding how MLUP effects urban development in Sub-Saharan Africa, a region undergoing increasing urbanization but frequently without appropriate planning frameworks (Allam et al., 2022; Durand et al., 2011).

MLUP has been recognized globally as one of the most significant generators of sustainable urban development, economic prosperity, social equity, and environmental sustainability (Ewing & Cervero, 2010; Voulgaris et al., 2017). In Sub-Saharan Africa, however, urban planning is confronted with many challenges including ineffective regulatory frameworks, high growth rates, inadequate infrastructure, and interference by politicians, which complicate effective implementation (Chirisa, 2014; Pieterse, 2010). These issues often result in spontaneous urban sprawl, inefficient use of land, and

growing socioeconomic disparities (Kloosterboer, 2019; Terfa et al., 2019). In Ethiopia, the Office for the Revision of the Addis Ababa Master Plan (ORAAMP) introduced MLUP in 2002, shifting from traditional zoning Sc to promote more integrated urban development (ORAAMP, 2002). Despite this shift, Addis Ababa continues to experience random land use, loss of functional specialization, and uncontrolled urban sprawl, undermining the potential benefits of MLUP (AACPPPO, 2017a). This study takes into account these persisting challenges, examines their impact on SEPE development, diagnoses underlying causes, and recommends actionable solutions to enhance MLUP implementation in Addis Ababa.

The research is guided by the following objectives: (1) To evaluate the distribution of urban functions to shape the spatial arrangement of the study area, (2) To assess the perceptions of urban planners on the multiple aspects of SEPE development. (3) To explore the Impact of MLUP on the SEPE development, (4) to investigate the root causes of MLUP dilemmas; and propose better MLUP and implementation approaches. The study takes a mixed-methods, exploratory sequential strategy, incorporating qualitative and quantitative data to improve validity and reliability. During the 2020-2021 School year, data was collected from 438 participants, including citizens, urban planners, and local authorities, and then analyzed using content and descriptive analysis.

The study's scope is confined to specific regions of Addis Ababa, with a concentration on the planning period 2002–2017. While this gives useful information, the conclusions may not be completely applicable to different areas or times. Furthermore, problems such as limited access to current secondary data and delays caused by the COVID-19 epidemic hampered the study process. Despite these limitations, the study adds to the larger discussion on urban planning by filling crucial gaps in the literature and making evidence-based recommendations for sustainable urban growth. By concentrating on Addis Ababa, the study illustrates the particular problems and prospects of MLUP in Sub-Saharan Africa, providing insights that might improve policy and practice in similar situations (Cao & Chatman, 2016; Use, 2014). MUD is

a fundamental principle of urban planning that integrates residential, commercial, institutional, and recreational uses within a distinct location. It generates active, sustainable, and economically thriving city spaces by promoting physical and functional interconnectedness (Bramiana & Widiastuti, 2017). As one of the top urban planning strategies of the era, MLUP is a good fit for design ideologies like Transit Oriented Development (TOD) and new urbanism that emphasize walkability, access, and social coherence (Herndon & Drummond, 2011; Mandelker et al., 2023; Schwanke, 2003; Zlygosteva, 2020). Why MLUP is important is that it increases efficiency in cities, reduces sprawl, and gives citizens better living standards by creating synergies between different uses (Grant, 2002a). In Addis Ababa, Ethiopia, the use of MLUP has become more pertinent given the rapid urbanization, growth of population, and urgent need for sustainable development in the city. This research explores the historical development, contemporary practices, and challenges of MLUP in Addis Ababa and its SEPE implications. By examining the transition from traditional zoning to mixed land use, the research aims to identify areas of knowledge gaps and provide suggestions on how to enhance urban planning practice in the city.

Addis Ababa's urban development has undergone radical transformations since its establishment in 1886. The settlement patterns of the city were originally shaped by the "sefer" or "camp" concept, introduced by Empress Taitu and araveraged residential neighborhoods based on social class (Chali et al., 2024; Tufa, 2008). The early settlements exhibited a heterogeneous character, marked by an absence of land use segregation or community exclusion. The spatial organization of these settlements typically radiated outward from a central point, often the palace or "Ras," extending toward the periphery. However, by 1936, Italian planners I. Guidi and C. Valle presented a radically different urban planning approach—one emphasizing the prestige of the colonizer and enforcing riAGJus segregation of inhabitants under Italy's five-year occupation. This segregation was not only spatial but also racial, categorizing dwellers as "native" (Addis Ketema) and "foreigner" (Casainchis). Their planning ideology prioritized functionality, reflecting a deliberate effort to reinforce colonial hierarchies and control through urban design. This shift

marked a significant departure from the earlier, more integrated settlement patterns, underscoring the impact of colonial ideology on the built environment. Foreign experts, like Sir Patrick Abercrombie and Luis de la Marían, influenced Addis Ababa's urban planning following independence, importing concepts such as the Neighborhood Unit and self-contained urban spaces (Tufa, 2008). Introduction of zoning in the 1986 Addis Ababa Master Plan initiated the trend towards functional specialization with permissible uses of land being defined by allowable zoning laws. In 2002, a new structural plan used restrictive zoning and prohibited uses while the use of mixed land use became a strategy employed in the fight against urban sprawl and facilitating vertical expansion (ORAAMP, 2002). Despite these efforts, the current settlement trends of the city reflect deficiencies in social and functional diversity. The Addis Ababa City Structural Plan (2004–2014) identifies the reduction in the quality of urban living and social mix in residential neighborhoods, particularly in new settlements (AACPPPO, 2017b). These past transitions point to the complexity of shifting from clean zoning to mixed land use, which is a process plagued by issues such as functional incompatibility and urban sprawl.

The study bases its background on theories of urban planning and development, more particularly the principles of MUD and TOD. MUD is centered on the convergence of different land uses to create dynamic, green urban places (Pucci & Vecchio, 2024). The "3Ds" framework—density, diversity, and design—is a theoretical foundation on which the relationship between mixed land use and pedestrian-friendly urban settings can be explained (Ewing & Cervero, 2010; Voulgaris et al., 2017). The study also refers to new urbanism theory, which promotes compact, walkable communities that promote reduced car use and increased social interaction (Shulman, 2021). These theories point to the ability of MLUP to ensure economic vitality, social equity, and environmental sustainability. But they also perceive the issue of balancing incompatible land uses, making them compatible, and solving issues of noise pollution and traffic congestion (Ben-joseph et al., 2010; Knaap & Talen, 2005).

While MLUP is widely recognized as a mechanism of sustainable urbanization, implementation in Addis Ababa identifies serious knowledge and practice gaps. Most literature has the tendency to omit the socio-economic and environmental implications of MLUP in urbanizing cities in the Global South. Especially, there is little empirical analysis on the issues of transitioning away from traditional zoning to MLUP, e.g., issues of functional incompatibility, asymmetrical distribution of services, and inadequate regulatory organizations (Ewing et al., 20Sc). In addition, the deterioration of urban dwelling places in Addis Ababa and the loss of social mix in residential areas bring an impetus to understand better how MLUP can be implemented effectively for ensuring sustainability and inclusiveness (AACPPPO, 2017b). The gaps confirm the applicability of this research in addressing the intricacies of MLUP and taking context-based suggestions forward for Addis Ababa.

The study question focuses on difficulties in applying MLUP in Addis Ababa, especially its effects on SEPE development. The research seeks to investigate the evolution of MLUP in Addis Ababa throughout history, scrutinize its application and challenges as it is, assess its SEPE effects, and recommend interventions to improve its efficiency in boosting sustainable urban growth. The study is focused on Addis Ababa and particularly deals with mixed land use practice in urban zones such as the MCC, MC, SC, and AGJ. The study has been put against the backdrop of the rapid urbanization of the city and the need for sustainable development, specially the post-2002 reformulation of the Addis Ababa Master Plan. In general, mixed land use is an essential strategy to drive sustainable urban development, particularly in rapidly growing cities like Addis Ababa. However, its implementation is riddled with deep challenges, including functional incompatibility, unequal service distribution, and weak regulatory urban land use managements. With the exploration of the historical evolution, prevalent practices, and impacts of MLUP in Addis Ababa, this study aims to counter these challenges and propose solutions to creating vibrant, inclusive, and sustainable urban landScapes.

1.2 Statement of the problem

Mixed Land Use Planning (MLUP) has emerged as a key strategy for fostering sustainable and equitable urban development by integrating residential, commercial, cultural, and institutional functions within compact, walkable, and economically vibrant urban spaces (Bramiana & Widiastuti, 2017; Voulgaris et al., 2017). While MLUP aligns with global urban models such as Transit-Oriented Development (TOD) and New Urbanism—which emphasize accessibility, social cohesion, and reduced sprawl (Herndon & Drummond, 2011; Shulman, 2021)—its implementation in rapidly urbanizing regions like Sub-Saharan Africa faces significant challenges. These include incompatible land uses, socio-economic disparities, weak regulatory frameworks, and infrastructural deficits (Echendu & Okafor, 2021; Watson, 2009c).

In Addis Ababa, Ethiopia, the shift from conventional zoning to MLUP—initiated under the Office for Revision of Addis Ababa Master Plan (ORAAMP) in 2002—has been undermined by functional incompatibility, urban sprawl, and declining social mix (AACPPPO, 2017a; ORAAMP, 2002). The city’s rapid urbanization, coupled with rising land values and socio-economic stratification, has exacerbated these issues, leading to residential degradation, unequal service distribution, and weakened social cohesion (Walks et al., 2013; Weldegebriel et al., 2021). For instance, the Addis Ababa City Structural Plan (2004–2014) observed a deterioration in urban quality and social diversity, particularly in newly developed areas (AACPPPO, 2017a). These challenges highlight critical research gaps in understanding how MLUP can be effectively operationalized in contexts with weak institutional frameworks, rapid population growth, and infrastructural constraints (Kloosterboer, 2019; Terfa et al., 2019).

A key concern is the socio-economic, physical, and environmental (SEPE) impacts of MLUP in Addis Ababa, particularly in strategic areas such as the Main City Center (MCC), Main Corridor (MC), Secondary Corridor (SC), and Around AGJ Junction (AGJ). The current implementation has led to functional conflicts, service inequities, and unregulated urban expansion, undermining MLUP’s potential to create vibrant and inclusive neighborhoods

(Henry et al., 2020; Moreno et al., 2021). Addressing these challenges requires policy and regulatory reforms to enhance land use compatibility, improve service distribution, and curb sprawl while promoting economic vitality and social equity.

Given these complexities, this study seeks to examine MLUP's historical evolution, current implementation barriers, and SEPE implications in Addis Ababa. By doing so, it aims to provide practical, context-specific recommendations for improving MLUP policies and practices. The findings will contribute to broader urban planning discourse, particularly in rapidly urbanizing Global South cities facing similar institutional and infrastructural constraints. Ultimately, the research seeks to inform strategies for fostering inclusive, sustainable, and economically dynamic urban spaces in Addis Ababa and beyond.

This study seeks to address the following key research questions: How has Mixed Land Use Planning (MLUP) evolved in Addis Ababa, and what factors have influenced its implementation? What are the key socio-economic, physical, and environmental (SEPE) impacts of MLUP in selected neighborhoods, including the Main City Center (MCC), Main Corridor (MC), Secondary Corridor (SC), and Around AGJ Junction (AGJ)? Lastly, what policy and regulatory reforms are needed to enhance MLUP's effectiveness in promoting equitable and sustainable urban development in Addis Ababa? By answering these questions, the research aims to provide actionable insights for improving MLUP policies and practices in rapidly urbanizing contexts.

1.3 Research objectives

1.3.1 General Objective

The general objective of this study is to analyze the implementation challenges and socio-economic, physical, and environmental (SEPE) impacts of Mixed Land Use Planning (MLUP) in Addis Ababa, with a focus on selected urban areas Main City Centers, Main corridor (MC), Secondary corridors (SC), and Around AGJ Junction (AGJ).

1.3.2 Specific Objectives

The specific objectives of the study include:

1. To assess the spatial distribution of urban functions and their influence on land use patterns in the study areas
2. To evaluate the perceptions of urban planners and stakeholders on the effectiveness of MLUP in promoting sustainable urban development.
3. To examine the SEPE impacts of MLUP in selected neighborhoods, focusing on socio-economic equity, physical infrastructure, and environmental sustainability.
4. To identify the root causes of MLUP implementation challenges in Addis Ababa, including policy gaps, governance issues, and socio-economic disparities.

1.3.3 Research questions

1. How does the spatial distribution of urban functions influence land use patterns in Addis Ababa's mixed-use areas (MCC, MC, SC, AGJ)?
2. How do urban planners and key stakeholders perceive the effectiveness of MLUP in achieving sustainable urban development goals in Addis Ababa?
3. What are the measurable socio-economic, physical, and environmental (SEPE) impacts of MLUP implementation in selected neighborhoods?
4. What policy, governance, and socio-economic factors most significantly hinder effective MLUP implementation in Addis Ababa?

1.4 Scope of the study

This research employs a structured analytical framework to examine MLUP implementation in Addis Ababa across three key dimensions. Thematically, it focuses on MLUP's SEPE impacts, particularly functional compatibility between land uses, equitable service distribution, and environmental sustainability - core principles of Mixed-Use Development (MUD) theory (Herndon & Drummond, 2011; Mandelker et al., 2023). This focus directly supports the study's objectives to analyze land use patterns (Objective 1) and assess SEPE impacts (Objective 3).

Spatially, the investigation concentrates on Addis Ababa's Kir-kose and Bole sub-cities, with particular attention to four strategically selected zones: the MCC, MC, SC and AGJ. These locations represent the spectrum of MLUP implementation from urban core to periphery (AACPPO, 2017a), enabling comprehensive evaluation of planner perceptions (Objective 2) and implementation challenges (Objective 4). Temporally, the study covers the 2002-2017 planning period following MLUP's introduction, with data collected during 2020-2021 to capture post-implementation effects while excluding more recent corridor developments (ORAAMP, 2002).

Methodologically, the research adopts a mixed-methods approach combining qualitative interviews with planners and stakeholders with quantitative analysis of land use and SEPE indicators, anchored in MUD principles (Mehaffy & Haas, 2020). The study deliberately excludes non-MLUP approaches and transient populations to maintain focus on permanent communities most affected by MLUP policies (Terfa et al., 2019), ensuring depth of analysis while addressing identified gaps in urban planning literature (Kloosterboer, 2019; Mandelker et al., 2023).

This carefully bounded Scope enhances the study's originality by providing context-specific insights into MLUP challenges in rapidly urbanizing environments (Watson, 2009c), while generating practical knowledge applicable to Addis Ababa and similar Global South cities (Caprotti, Cowley, Datta, Broto, Gao, Georgeson, Herrick, Odendaal, & Joss, 2017). The focused approach ensures methodological rigor while allowing comprehensive examination of MLUP's complex impacts within manageable parameters.

1.5 Significance of the Study

This research provides valuable insights into the implementation and impacts of Mixed Land Use Planning (MLUP) in Addis Ababa's urban context. By examining four strategically selected areas - Main City Center (MCC), Main Corridor (MC), Secondary Corridors (SC), and Around AGJ Junction (AGJ) - the study offers empirical evidence of how MLUP functions in a rapidly

developing African city. The investigation systematically evaluates spatial patterns, stakeholder perspectives, and policy implementation challenges, contributing to a more nuanced understanding of urban planning effectiveness in Addis Ababa's unique environment.

1.5.1 Theoretical Significance

The study makes important theoretical contributions by applying and adapting mixed-use development principles to institutional-constrained urban settings. Through its rigorous analysis of land use distribution patterns and socio-economic, physical, and environmental (SEPE) impacts, the research expands current knowledge about sustainable urban planning in developing cities. The examination of planner and stakeholder perspectives, combined with the identification of governance barriers, provides valuable empirical evidence that enhances theoretical discussions about urban policy implementation in challenging contexts.

1.5.2 Practical Significance

This study provides valuable practical insights for urban planners and policymakers by delivering evidence-based findings on MLUP implementation. It identifies critical spatial disparities, institutional challenges, and necessary policy reforms to promote more equitable and sustainable urban development. Although primarily focused on Addis Ababa, the study's methodological approach and contextual findings can guide planning practices in other rapidly urbanizing cities with similar governance and growth challenges. The concentrating efforts of measurable MLUP outcomes of the research ensures its findings yield concrete, actionable recommendations, thereby making it more relevant and applicable in real-world urban planning practice.

1.5.3 Policy Implications

The study has significant policy implications for Addis Ababa and other rapidly expanding cities' urban planning policies. Through identifying the root causes of MLUP problems and recommending improved planning strategies,

the research provides a basis for policy revision to ensure inclusive and sustainable development. Policymakers can make use of the research findings to craft regulations that promote balanced land use, equitable service provision, and environmental protection. This is especially crucial in the case of Sub-Saharan African cities, which are characterized by poor regulatory systems and high rates of population growth and thus may hinder effective urban planning (Watson, 2009a; Weldegebriel et al., 2021).

1.5.4 Originality and Innovation

The research is original in focusing on Addis Ababa, a rapidly expanding city in the Global South, where the implementation of MLUP is faced with particular challenges. Unlike previous studies that are predominantly carried out in developed cities, this study provides context-specific evidence on the SEPE impacts of MLUP in a developing urban context. The use of a mixed-method, exploratory sequential design, involving face-to-face interviews, questionnaires, and content analysis, contributes to the research's novelty. This process allows for comprehensive understanding of the complexities of MLUP and offering new insights into its use and impacts (Grant, 2002b; Kloosterboer, 2019).

1.5.5 Societal Impact

The society benefits from the research by addressing urgent urban concerns and ensuring social justice and environmental protection. Through the demand for equitable use of land for the welfare of all citizens, the research results in improved living standards, economic growth, and environmental health in Addis Ababa. It also emphasizes ensuring public involvement in urban planning processes such that the various demographic groups' interests are represented. Furthermore, the focus of the study on minimizing ecological harm complements global sustainability goals and therefore makes it relevant to cities across the world facing the same urbanization issues (Habitat, 2003; Schwanke, 2003).

1.5.6 Research Contributions

This study makes three key contributions to urban planning knowledge and practice. Theoretically, it develops a context-specific framework for understanding Mixed Land Use Planning (MLUP) in rapidly urbanizing cities, addressing gaps in the literature on its implementation under institutional constraints by systematically analyzing MLUP's socio-economic, physical, and environmental (SEPE) impacts, thereby extending theoretical discussions on sustainable urban expansion in the Global South. Practically, the study identifies actionable solutions to real-world MLUP challenges, including spatial mismatches, policy gaps, and governance barriers in Addis Ababa, offering urban planners and policymakers evidence-based strategies to improve land use compatibility, service distribution, and regulatory effectiveness—directly responding to Research Questions 1 (spatial distribution) and 4 (root causes of implementation challenges). Additionally, it lays a foundation for future research by examining MLUP's performance in Addis Ababa's distinct neighborhoods (MCC, MC, SC, AGJ), providing a replicable methodology and comparative insights for similar cities while highlighting unresolved questions about long-term impacts (Research Questions 2–3), inviting further investigation into equitable and sustainable urban growth. Collectively, these contributions bridge theory and practice, emphasizing the need for context-specific planning interventions in fast-growing cities, advancing academic discourse, and equipping practitioners with tools to refine MLUP policies and implementation.

1.6 Research limitations

The present study has certain limitations that influence its scope and generalizability. First, data accessibility challenges arose due to disorganized institutional archives, making it difficult to obtain recent secondary data such as government maps, reports, policies, and journals - a situation further exacerbated by COVID-19 disruptions. Methodological constraints include a sample size (438 respondents) that may not adequately represent Addis Ababa's diverse population, while the geographical focus on MCC, MC, SC, and AGJ areas and the 2002-2017 study period potentially limit broader

applicability and fail to capture recent MLUP developments. Analytical limitations stem from the complex interplay of socio-economic, physical and environmental (SEPE) factors requiring certain assumptions, along with Likert-scale surveys that may oversimplify nuanced perspectives. To address these limitations, future research could: leverage digital tools to organize archives and access municipal databases; employ methodological improvements like expanded sampling and longitudinal data collection; and enhance analytical rigor through mixed-methods approaches, advanced spatial analysis (GIS), and greater stakeholder engagement. These refinements would strengthen the validity, generalizability and practical relevance of subsequent studies.

1.7 Organization of the dissertation

This study is structured into six chapters, beginning with Chapter One, which introduces the research context, including background, problem statement, objectives, research questions, significance, scope, and limitations, and proceeding to Chapter Two, which contains the literature review—the theoretical as well as empirical studies—while identifying gaps in research and developing the conceptual framework. Chapter Three presents the research design, i.e., the approach, methodology, sampling strategy, data sources, and methods of analysis, interpretation, and presentation, while Chapter Four illustrates the case study area and its demographic composition and land use pattern systematically, examining the impacts of MLUP on SEPE development, identifying the root causes, and providing the analyzed data. Chapter Five integrates the findings by responding to the four research objectives, their implications, limitations, and significance, and finally, Chapter Six concludes the research, bringing recommendations on Urban Function Distribution, Urban Planners' Perceptions, MLUP Challenges, and the SEPE Development Impacts, as well as the causes of the MLUP problems.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This literature review synthesizes theoretical and empirical research on MLUP and its impact on SEPE Development, with a focus on Addis Ababa, Ethiopia, aligning with the study's objectives. The review is structured into conceptual literature (defining MLUP models and characteristics), theoretical literature (urban planning theories and sustainability frameworks like SDG 11), empirical literature (global trends, African case studies, and Addis Ababa's MLUP evolution), and research gaps (contextual disparities between Western models and African urban realities, limited empirical data on SEPE impacts, and policy-practice divides), culminating in an analytical framework that employs a mixed-methods approach to assess MLUP's role in sustainable urban development.

2.2 Conceptual Literature on Mixed Land Use Planning (MLUP)

MLUP is an urban planning approach that integrates residential, commercial, and recreational functions within a defined spatial area to promote sustainability, efficiency, and livability (Alexander & Tomalty, 2002). Historically, MLUP traces its roots to pre-industrial cities, where mixed-use development was the norm before modernist zoning led to functional segregation post-World War II (Watson, 2002). The concept aligns with Sustainable Development Goal (SDG) 11, which emphasizes inclusive, safe, resilient, and sustainable cities (Yuan, 2021).

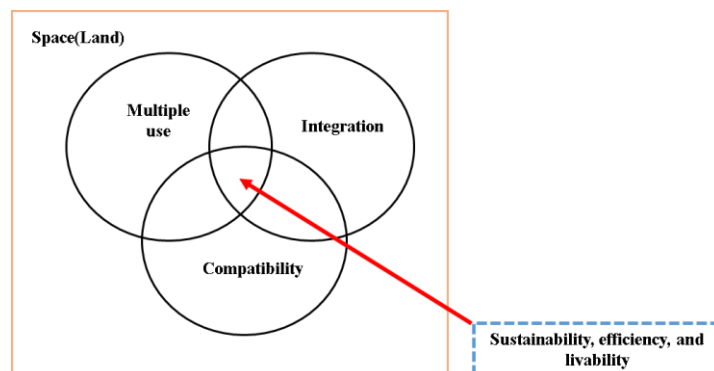


Figure 2 1The comprehensive governing MUD concept,

Source: Mixed-use development in theory and practice: Learning from Atlanta's mixed experiences (Herndon & Drummond, 2011).

2.2.1 Key Characteristics of MLUP

Table 2.1 The literature identifies several defining features of MLUP:

Characteristic	Description	Source
Diversity of Uses	Synergistic coexistence of residential, commercial, and recreational functions.	(Hoppenbrouwer & Louw, 2005)
Pedestrian-Oriented Design	Prioritizes walkability to reduce car dependency and enhance accessibility.	(Barton et al., 2015)
Compatibility	Ensures harmonious integration of land uses to minimize conflicts.	(Grant, 2002a) (Moreno et al., 2021)

2.2.2 Theoretical Models of MLUP

Table 2.2 Models that shaped the conceptualization of MLUP.

Model	Key Features	Source
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Model	Key Features	Source
Jacobs (1961)	Advocates horizontal mixing of uses to foster urban diversity and vibrancy.	(Wendt, 2009)
Rowley (1996)	Emphasizes physical form, influenced by urban texture and policy frameworks.	(Rowley, 1996)
Hoppenbrouwer & Louw (2005)	Introduces vertical and temporal integration of land uses.	(Hoppenbrouwer & Louw, 2005)

MLUP stands in contrast to the CIAM’s Functional City model, which promoted segregated zoning. Instead, MLUP advocates for compact, integrated urban forms that enhance sustainability and social interaction (Caprotti, Cowley, Datta, Broto, Gao, Georgeson, Herrick, Odendaal, & Joss, 2017). By optimizing land use, reducing sprawl, and improving livability, MLUP serves as a critical framework for contemporary urban development (Moreno et al., 2021).

2.3 Urban Planning and MLUP’s Alignment with SDG 11

MLUP is vital for achieving SDG 11, guided by key urban planning theories: General Systems Theory (GST), which emphasizes interdependencies in urban systems (Gershenson, 2013); Procedural vs. Substantive Planning, distinguishing between process-oriented and land-use knowledge approaches (Vigar, 2009); and New Urbanism/Smart Growth, promoting walkability and mixed-use development (Klopp & Petretta, 2017). By addressing urban sprawl and infrastructure gaps, MLUP advances SDG 11 (Caprotti, Cowley, Datta, Broto, Gao, Georgeson, Herrick, Odendaal, & Joss, 2017). It aligns global sustainability goals with local needs, fostering resilient, equitable, and sustainable cities.

2.3.1 Urban Planning Theories

The study is grounded in three key theoretical frameworks that inform MLUP:

Table 2.3 Underpinning theory of the study

Theory	Key Principles	Source
General Systems Theory (GST)	Examines interdependencies between urban subsystems (social, economic, physical, environmental).	(Gershenson, 2013)
Procedural vs. Substantive Planning Theories	Distinguishes between decision-making processes (procedural) and land-use knowledge (substantive).	(Vigar, 2009)
New Urbanism / Smart Growth	Advocates for walkability, mixed-use density, and transit-oriented development.	(Klopp & Petretta, 2017)

2.3.2 MLUP and Sustainable Development Goal (SDG 11)

MLUP serves as a critical instrument for achieving SDG 11, which aims to make cities inclusive, safe, resilient, and sustainable. At its core, MLUP directly supports three key targets of SDG 11 by fostering inclusive urban planning (Target 11.3), minimizing environmental degradation (Target 11.6), and enhancing the quality and accessibility of public spaces (Target 11.7)

(Caprotti, Cowley, Datta, Broto, Gao, Georgeson, Herrick, Odendaal, & Joss, 2017). These contributions are operationalized through strategic land use policies that promote compact, connected, and socially equitable urban development. For instance, by encouraging efficient land use, MLUP helps cities expand affordable housing options (Target 11.1), while reduced car dependency—facilitated by mixed-use zoning and transit-oriented development—advances sustainable transport systems (Target 11.2). Furthermore, well-designed MLUP frameworks strengthen social cohesion by creating inclusive urban environments that mitigate spatial inequalities (Target 11.3), as illustrated in Table 2.4.

Table 2.4 MLUP Benefits in Relation to SDG 11 Targets

MLUP Benefits	SDG 11 Targets
Efficient land use	Affordable housing (11.1)
Reduced car dependency	Sustainable transport (11.2)
Enhanced social cohesion	Inclusive urbanization (11.3)
Minimizing environmental degradation	Reducing environmental harm (11.6)
Enhancing the quality and accessibility of public spaces	Improving public spaces (11.7)

Beyond these targeted outcomes, MLUP's broader value lies in its capacity to balance global sustainability objectives with local urban challenges. By optimizing urban functionality—through measures such as density management, green infrastructure integration, and participatory planning—MLUP not only aligns with the normative aspirations of SDG 11 but also addresses context-specific barriers like sprawl, infrastructure deficits, and socio-economic disparities. This dual focus positions MLUP as both a policy tool and a practical framework for translating sustainable urbanization

principles into measurable progress, particularly in cities grappling with rapid growth and limited resources.

2.4 Review of Empirical Literature on MLUP:

2.4.1 Global Perspectives

Empirical studies on MLUP implementation globally highlight both its advantages and challenges. Research indicates that MLUP effectively reduces urban sprawl and enhances urban livability by promoting more efficient land use (Fan et al., 2019). Additionally, it aligns with SDG 11 by fostering sustainable urban development, as noted by (Kloosterboer, 2019). However, significant challenges persist, including gentrification, which often displaces low-income residents (Delgado-Ramos & Guibrunet, 2017), and policy fragmentation that undermines cohesive implementation. Regional analyses further reveal distinct outcomes; in Europe and North America, MLUP has been successful in curbing urban sprawl but has also heightened gentrification risks (Caprotti, Cowley, Datta, Broto, Gao, Georgeson, Herrick, Odendaal, & Joss, 2017). In contrast, Asian cities have experienced economic benefits from mixed-use zoning, though at the cost of increased traffic congestion (R. Huang et al., 2018). These findings underscore the need for context-specific strategies to maximize MLUP's benefits while mitigating its unintended consequences

2.4.2 MLUP Implementation in the African Context

The adoption of MLUP in Africa is shaped by colonial legacies and the prevalence of informal urbanization, leading to varied implementation across the continent. In South Africa, post-apartheid MLUP policies have been designed to address historical spatial inequalities and promote more equitable urban development (Du Plessis, 2015). However, challenges persist in ensuring effective enforcement and inclusivity. In contrast, Nigeria faces significant hurdles in formal MLUP implementation due to the dominance of informal settlements, which often operate outside regulated planning frameworks (Vandersmissen & George, 2024). These informal developments complicate efforts to enforce structured land use policies, highlighting the need for adaptive planning approaches that account for Africa's unique urban dynamics.

The disparities in MLUP adoption across the continent underscore the influence of historical, political, and socioeconomic factors in shaping urban governance and development outcomes.

2.4.3 MLUP in Addis Ababa

The evolution of land use planning in Addis Ababa, Ethiopia, reflects significant historical shifts and contemporary challenges. Before 1941, the city's development was characterized by organic "Sefer" (camp-based) settlements, which grew without formal planning structures. During the Italian occupation (1935–1941), segregated zoning was introduced, laying the groundwork for later urban divisions. In the post-2002 period, structural plans sought to institutionalize MLUP, yet weak enforcement has limited their effectiveness (ORAAMP, 2002). Current challenges reveal mixed outcomes across economic, social, and environmental dimensions. Economically, while MLUP initiatives have spurred local job creation, they have also heightened displacement risks due to gentrification (Terfa et al., 2019). Socially, rapid urban redevelopment has eroded traditional community cohesion in newly planned areas (AACPPO, 2017b). Environmentally, poor urban design has exacerbated heat island effects, worsening livability (Pandey et al., 2022). These findings highlight the need for stronger policy enforcement and inclusive planning approaches to balance growth with equity and sustainability in Addis Ababa.

2.5 Research Gaps and Contextual Challenges in MLUP Implementation

A critical examination of existing literature reveals significant gaps in both the theoretical frameworks and practical implementation of MLUP, particularly within the African urban context. One of the most pressing issues is the contextual disconnect, where Western-derived MLUP models—often rooted in formal, regulated urban systems—fail to account for the dynamic, informal, and institutionally complex realities of African cities (Watson, 2009a). This misalignment results in planning policies that are either ineffective or counterproductive, exacerbating urban inequalities rather than resolving them. Compounding this challenge is an empirical research gap, particularly in

assessing the multi-dimensional SEPE impacts of MLUP in rapidly urbanizing cities such as Addis Ababa (Zewdie et al., 2021). Without localized evidence, policymakers lack the data needed to refine planning frameworks for better urban outcomes.

Further complicating MLUP adoption is the persistent policy-practice divide, where well-intentioned planning guidelines are undermined by weak implementation, institutional fragmentation, and regulatory ambiguities (AACPPO, 2017b; Cirolia & Berrisford, 2017). These governance shortcomings are exacerbated by infrastructure deficits, which limit the feasibility of planned interventions (Kloosterboer, 2019), and negligent enforcement mechanisms, allowing non-compliance to persist (AACPPO, 2017b). A particularly critical theoretical gap is the inadequacy of Western-centric urban theories in addressing African urban challenges, such as pervasive informality, rapid rural-urban migration, and weak institutional governance (Watson, 2009c). While MLUP has globally proven effective in promoting sustainable urban development—mitigating sprawl and enhancing livability—it also introduces challenges such as gentrification-induced displacement and traffic congestion (Caprotti, Cowley, Datta, Broto, Gao, Georgeson, Herrick, Odendaal, Joss, et al., 2017; Y. Huang, 2020). In Africa, colonial-era planning legacies and the dominance of informal settlements further complicate MLUP's applicability, often rendering formal zoning regulations irrelevant (Vandersmissen & George, 2024).

Addis Ababa exemplifies these struggles, grappling with historical zoning legacies, inconsistent policy enforcement, and socio-environmental trade-offs stemming from rapid but uneven urban growth (Terfa et al., 2019) (Pandey et al., 2023). Addressing these gaps necessitates context-sensitive planning models that prioritize adaptive governance, participatory policymaking, and empirical research tailored to African urbanism. This study seeks to contribute to this discourse by analyzing MLUP's SEPE impacts in Addis Ababa, with the broader objective of informing more equitable and sustainable urban planning frameworks.

2.6 MLUP Effects on SEPE Development in Addis Ababa

This study investigates the impact of MLUP on SEPE development in Addis Ababa, focusing on the city's core and peripheral zones between 2002 and 2017. The research addresses three critical dimensions of urban planning in the Ethiopian capital. First, it analyzes the spatial distribution of urban functions, assessing how MLUP policies have shaped land use patterns, infrastructure development, and service accessibility across different areas of the city. Second, the study explores planners' perceptions of MLUP implementation, examining their views on policy effectiveness, challenges encountered, and the overall planning process. Third, the research identifies and analyzes the root causes of persistent MLUP dilemmas, including regulatory gaps, institutional weaknesses, and the disconnect between policy frameworks and on-the-ground realities. By examining these interconnected aspects, the study aims to provide a comprehensive understanding of how MLUP has influenced Addis Ababa's urban transformation and to identify pathways for more effective and equitable urban planning in the future. The 15-year timeframe (2002-2017) allows for an assessment of planning outcomes following major structural plan revisions, offering valuable insights into long-term trends and impacts.

2.7 Analytical Framework of the Study

This study employs a robust analytical framework that integrates mixed methodologies to systematically evaluate the impact of MLUP on SEPE development. The framework establishes MLUP policies as the independent variable while treating SEPE outcomes as the dependent variable, with key urban characteristics – including density, land use compatibility, and geographic location – serving as critical moderating factors. Methodologically, the approach combines three complementary techniques: spatial analysis through ArcGIS mapping to visualize urban transformation patterns, stakeholder perception surveys using Likert scales to capture qualitative insights from planners and policymakers, and statistical validation through ANOVA testing to determine significant relationships. The theoretical foundation draws from General Systems Theory (GST) to examine MLUP's holistic urban impacts and New Urbanism principles to assess Neighborhood-scale design effectiveness. These theoretical lenses facilitate a multi-scalar

analysis of how planning interventions produce systemic effects across Addis Ababa's urban fabric. The analytical framework (Figure 2.2) visually represents these relationships, illustrating the dynamic interplay between MLUP drivers (policy instruments and economic forces) and SEPE outcomes, mediated through the identified moderating variables. This comprehensive approach enables both quantitative measurement and qualitative interpretation of MLUP's complex urban consequences.

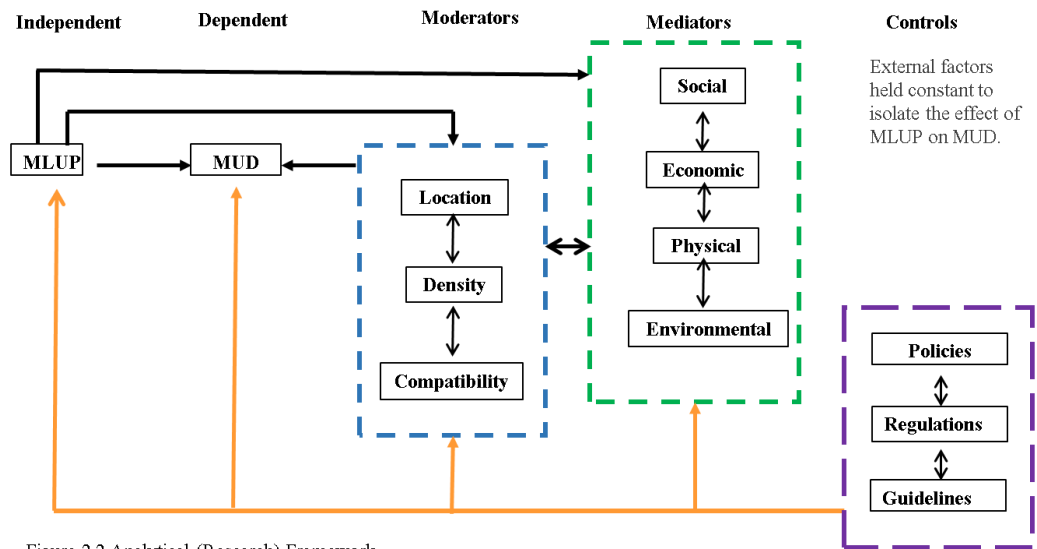


Figure 2.2 Analytical (Research) Framework

Figure 2.2 Analytical (research) Framework

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction to Methodology

This part outlines the research design, methodology, and methods used to assess the impact of the MLUP on SEPE development in Addis Ababa, Ethiopia. A clear methodology guarantees transparency, quality, and replicability, and enhances the believability of the results. The research uses a mixed-methods approach through the integration of qualitative and quantitative methods to appropriately examine the MLUP. Mixed-methods research, according to Creswell (2017), couples quantitative precision with qualitative richness, providing an in-depth understanding of urban land-use dynamics.

The exploratory sequential design begins with qualitative data collection (thematic analysis, interviews) and continues with quantitative methods (spatial analysis, household surveys), enabling robust data triangulation between planners, residents, and secondary sources. GIS tools (ArcMap) and statistical packages (SPSS) enable spatial and analytical accuracy to yield theoretically sound and policy-relevant outcomes. The pragmatic approach, as emphasized by Creswell (2017), allows for adaptability to accommodate methods to the city setting of Addis Ababa for meaningful planning and decision-making information. This systemic yet flexible process lends validity and utilitarian value to the study.

3.2 Sampling Design of the Study Area

The study adopted a mixed-method sampling strategy, integrating non-probability and probability techniques to comprehensively assess Addis Ababa's urban heterogeneity. Kir-kos and Bole sub-cities were purposively selected for their strategic significance (AACPPO, 2017a), geographical adjacency, and socio-spatial diversity—spanning from the urban core to peripheral zones. Their inclusion accounted for political, historical, and economic variations, ensuring a representative analysis of mixed land-use planning (MLUP) efficacy and broader urban development trends. Kir-kose as the historical core of Addis Ababa is the city of origin and is also a political and administrative hub, with important national monuments and government

institutions (Cochrane & Zewde, 2018; Studies, 2004). While Bole is a strategic connectivity between the inner city and suburbs, with rapidly developing status, high-rise buildings, world-class offices, and other prominent infrastructure such as the Bole International Airport and Light Rail Transit (LRT), which enhanced the local and international connectivity (Malisa et al., 2020; Watson, 2009b). Together, the sub-cities capture Addis Ababa's urban development—Kir-kos its political and historical heritage, and Bole modern economic and infrastructural development—therefore being appropriate for the analysis of the city's different land use, activity concentrations, and development trends (Trondheim, 2016). Figure 3.1 is the spatial location map of study areas that marks the MCC, MC, SC, and AGJ.

3.2.1 Selection of the study sites

The selective criteria for each study area—Main City Center (MCC), Main Corridor (MC), Sub-Corridor (SC), and Around Gore Junction (AGJ)—are detailed based on various characteristics. The distance from the city center (Arada Georges) to each study area varies, with MCC located 3 km away, MC at 5 km, SC at 7 km, and AGJ at 10 km. Socially, MCC exhibits a modern lifestyle with reduced local and traditional influences, while MC features a modern streetscape with high-corridor development. SC has moderate streets and medium corridor development, whereas AGJ maintains a predominantly local and traditional lifestyle. Economically, MCC has the highest business transactions, including international offices, while MC has a high-density, vibrant economy. SC consists of low-rise houses with a more vibrant economy, and AGJ serves as a link between suburban and transitional economies.

Public service access in MCC and MC includes international and national institutions, while SC provides basic goods and services with commercial activity along sub-arterial roads. AGJ offers more local and traditional services. Transportation accessibility is high in MCC, with LRT, buses, taxis, and private automobiles available, while MC, SC, and AGJ have moderate accessibility, relying on buses, taxis, and private automobiles. Land valuation and urban development levels are highest in MCC, higher in MC, high in SC, and moderate in AGJ.

Settlement types vary, with MCC serving as the main city center hosting critical functions like international organizations. MC acts as a major corridor connecting Bole International Airport to the city center, while SC is a highly active sub-corridor with commercial shops. AGJ functions as a junction with stations linked to the expressway. The urban settlement inception periods differ, with MCC established in 1889, MC in 1948, SC in 1960, and AGJ in 1970. Corridor development levels are highest in MCC, major in MC, moderate in SC, and high in AGJ.

The study explored into specific areas within the sub-cities, focusing on Woreda 6/7/9/10 at MCC, Woreda 1, 2, and 9 along the MC in Kir-kos, and Woreda 4 in the transition zone of Sub-Arterial Street (SAS) SC and Woreda 11 (AGJ) AGJ in Bole. These locations were determined based on the criteria outlined in the Structural Plan Manual (2012), ensuring a strategic representation of the diverse development contexts within the city (see Fig. 3.2).

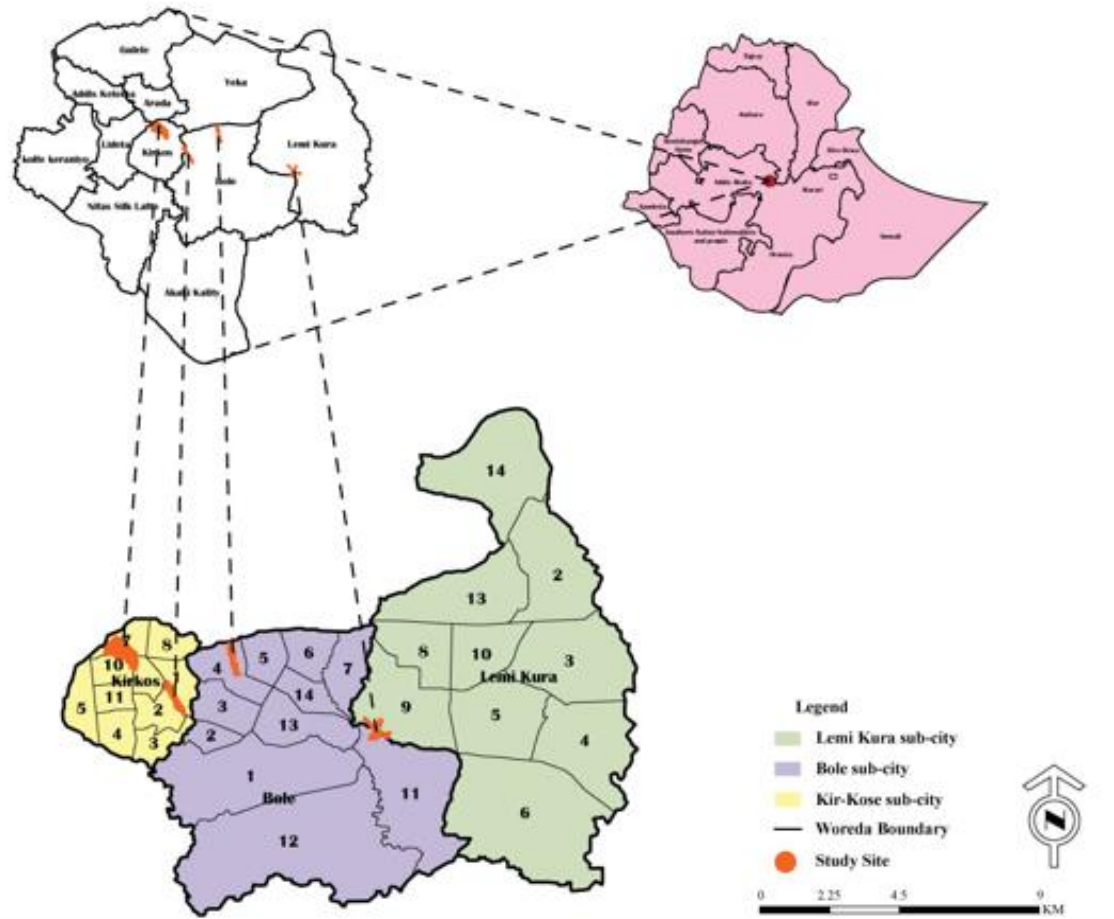


Figure 3.1 Location map of the study areas

Source: Addis Ababa City Government (2012) (AACPPO, 2017b).

The study digs into a detailed investigation of land use trends in residential, commercial, and mixed sectors of chosen sub-cities. The analysis takes a methodologically thorough approach, combining quantitative and qualitative approaches and adhering to accepted standards. This in-depth quantitative investigation examines spatial features, intrinsic activity nature, and overall dimensions, providing a thorough knowledge of the physical influence of current mixed land use planning and development on the urban landscape.

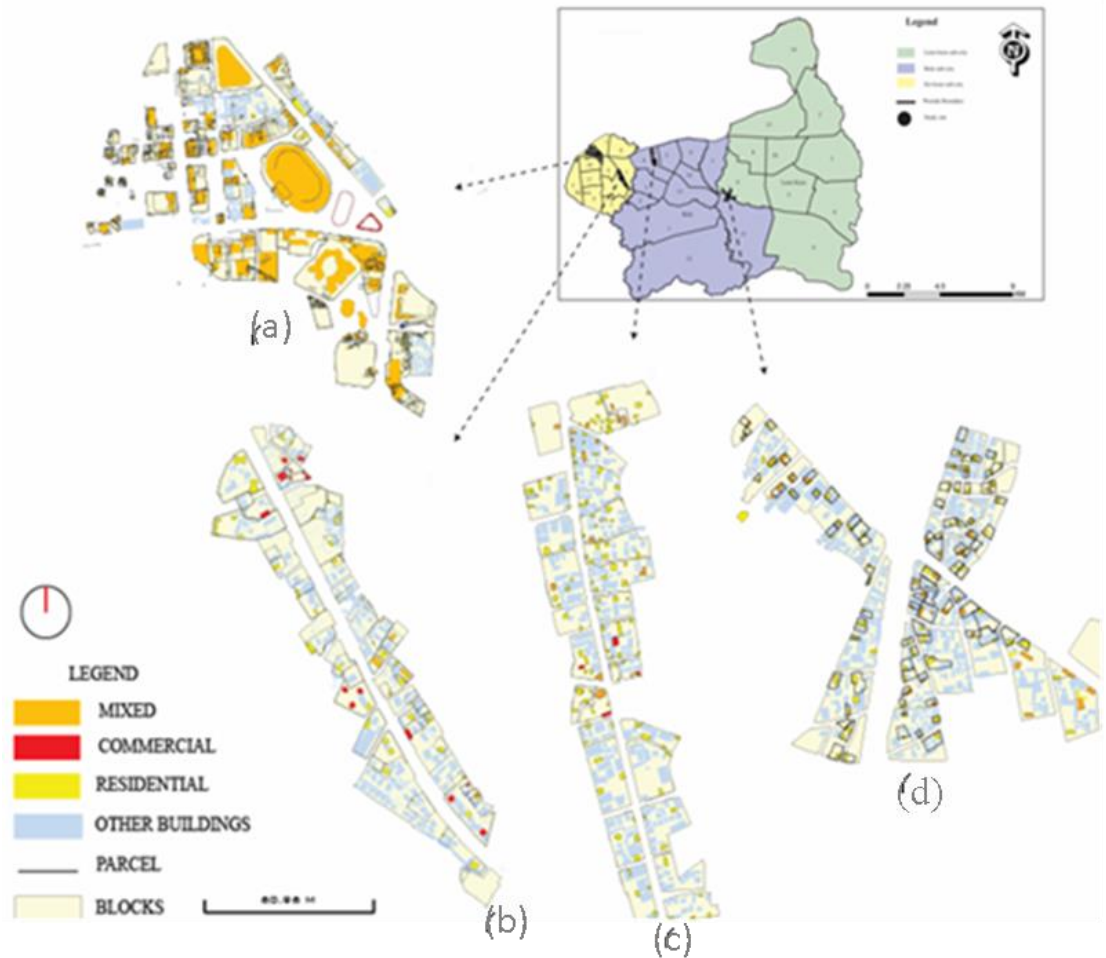


Figure 3.2 Map showing each of the study sites

(Source: structural plan manual dated May 2012, provided by the Addis Ababa authorities and updated in air Map obtained from EMA, over lay current google earth Map 2023).

Part (a) covers the MCC study area, which comprises Woreda 6, 7, 9, and 10 (MCC). Part (b) focuses on Woreda 1, 2, and 9, emphasizing the Main Corridor (MC) or MC from Dembel to the Wollo-Sefer round-about. Part (c) concentrates on Woreda 4, also known as the Hayahulet roundabout, to the cross junction near the new stadium, which represents (SC) the Sub-Arterial Street (SAS). Finally, part (d) focuses on Woreda 11, also known locally referred as the AGJ crossroads (AGJ). It is important to note that when we refer to distance from the center, we specifically denote the straight-line distance

from Minilik Square outward to the periphery, providing a precise framework for understanding the spatial relationships of these selected sites.

3.3 Research Philosophy

This study utilizes a pragmatic research philosophy that is concerned with combining qualitative and quantitative approaches to solve rich real-life problems, thus a perfect fit for the study of the SEPE impacts of the MLUP in Addis Ababa. Pragmatism is selected based on its methodological adaptability, applicability, and openness to various approaches such as interviews, questionnaires, observations, and spatial analysis to attain a comprehensive understanding of urban planning challenges. While pragmatism enjoys advantages such as methodological adaptability and applicability, it is also faulted for lacking philosophical depth and requiring advanced integration of methods. In the case of Addis Ababa, the philosophy is applied through the mixed-methods approach, that is, expert opinion, resident perspectives, and key informant perspectives, to consider the impact of MLUP thoroughly. Pragmatism suits this study as it addresses the focus of the study, yielding theoretically valid and practically applicable outcomes to enhance policy-making and city planning (Maddux & Donnett, 2015; Peirce., 1916). This approach assures dependability, credibility, and representativeness, thus the best way to respond to the intricacies in the challenges of Addis Ababa urban development (Creswell, 2017).

3.4 Research Design

This study adopts a mixed-methods research design, integrating both exploratory and descriptive approaches to ensure a comprehensive analysis. The exploratory design facilitates qualitative investigation, allowing for in-depth observation of the diverse factors contributing to urban fragmentation in rapidly developing cities. Meanwhile, the descriptive design supports quantitative analysis, enabling structured data collection and systematic interpretation. By combining these methodologies, the study strengthens its analytical rigor, providing a holistic understanding of the socio-economic, physical, and environmental impacts of contemporary mixed land-

use planning. This dual approach enhances the validity and depth of findings, ensuring a coherent and logically structured examination of urban development dynamics. (Creswell, 2017; Kothar, 2004). With the application of a mixed-method, exploratory sequential design (Fig. 3.3), the research design initiates with a qualitative stage that consists of literature reviews, key informant interviews, and thematic analyses. This is followed by a quantitative phase, which involves surveys of residents and local communities to gather empirical data. This sequential and adaptive approach offers a reliable assessment of the effect of mixed land use planning on spatial development dynamics in Addis Ababa (Mathison, 2014). Additionally, rigorous pre-testing during fieldwork enhanced the reliability of data collection instruments, further supporting the methodological soundness of the study. By combining these strategies, the research design provides an in-depth and holistic explanation of the opportunities and challenges of urban sustainable development within contexts of rapid urbanization.

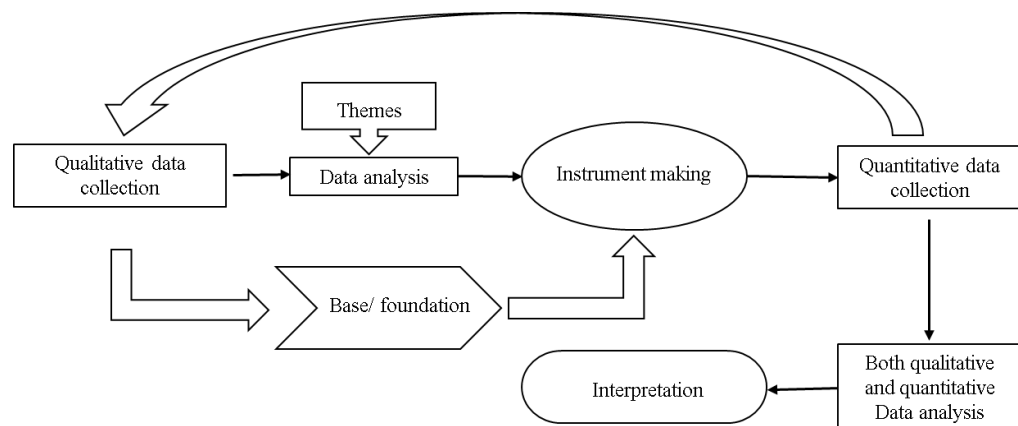


Figure 3.3 Study design: Sequential exploratory mixed–methods approach study design:, Source : Tariku et.al.,2025

3.5 Research Approach

The study employs a mixed-methods approach, uniting qualitative and quantitative methods for an in-depth exploration of the multi-dimensional impact of MLUP. The qualitative phase is focused on examining the perception and experience of urban planners and citizens and provides rich, nuanced information regarding human and social features of urban planning. The stage

is crucial to determine the subjective aspects of the way MLUP influences communities and stakeholders.

At the same time, the quantitative phase studies spatial forms and statistical relationships, making an objective assessment of the physical and structural impacts of MLUP. Synthesizing the two methods, the study ensures a full understanding of the phenomenon, with the physical and non-physical implications of urban planning projects being investigated.

The choice of the mixed-methods approach is deliberate and is in close alignment with the research goals. It allows for comprehensive analysis of the complex relationship between human experience and spatial results and ensures that the research is exhaustive and well-rounded. Starting from the choice of study locations and going through to the judicious application of sampling techniques, every step of the methodology is aimed at ensuring the highest credibility and reliability levels.

By adhering rigorously to these procedures, the research not only enhances the strength of its findings but also ensures that the conclusions and insights drawn are valid and applicable. Such methodological rigor is crucial in developing knowledge in urban planning and informing future policy and practice.

3.6 Sources of Data

This study employed both primary and secondary data to ensure methodological rigor and analytical depth, collecting primary data through engagements with diverse stakeholders including urban planning offices, government and non-governmental institutions, real estate developers, and local residents. Key institutional data was obtained from government bodies such as the Addis Ababa City Plan Commission, Land Administration and Survey Bureau, and Ministry of Urban Development and Construction, supplemented by contributions from non-governmental stakeholders including real estate developers, urban planning consultancies, and international partners like UN-Habitat Ethiopia and the Ethiopian Urban Planner Association, with

additional insights from academic institutions such as Addis Ababa University's School of Built Environment and the Ethiopian Civil Service University. Qualitative expertise was further enriched by professionals in architecture, GIS, and civil engineering (particularly transport and infrastructure specialists), while senior experts including department heads, managing directors, and planning specialists played a crucial role in data validation and oversight to ensure reliability. Secondary data was systematically gathered from the Addis Ababa City Planning Commission Offices (AACPPO, 2017a) along with Scholarly books, official reports, public documents, and government records, all selected through stringent inclusion criteria prioritizing relevance, credibility, and clarity - these sources provided essential historical, economic, and social context for comparative analysis and primary data validation, while also helping identify urban development trends, best practices, constraints, and governance systems (Creswell, 2017).

3.7 Sampling Design

3.7.1 Sample Population

The study employed a diverse and representative sample population to ensure comprehensive insights into urban planning dynamics, utilizing a multi-modal approach that combined qualitative and quantitative methods. For qualitative data, 14 senior planners, managers, and decision-makers were interviewed, selected via snowball sampling across sub-city zones (Appendix E, Table 16), ensuring expert validation from experienced professionals in government and planning sectors. Quantitative data collection involved administering a Likert-Scale questionnaire to urban planners (Shahab, 2019), drawing from 330 planners out of 523 registered Ethiopian Urban Planner Association members working across Addis Ababa's 11 sub-cities. A targeted subset of 40 expert planners from Bole and Kir-kos sub-cities—areas with high planning activity—was analyzed in depth, with 10 planners per site interviewed in four study areas (MCC, MC, SC, AGJ) using snowball sampling (Appendix C). Additionally, 384 households from these areas (MCC=81, MC=81, SC=126, AGJ=96) were surveyed via random sampling techniques (Noor & Tajik, 2022; Singh et al., 2011) to capture resident perspectives on MLUP challenges, lived experiences, and policy perceptions (Appendix D, Table 15). To enhance

methodological rigor, a triangulation approach—integrating interviews, surveys, and observational methods—was employed, ensuring data validity through expert validation (senior planners) and community input (residents), resulting in a balanced, evidence-based framework (Cameron, 2015).

3.7.2 Sample Size

The sample size for households' population characteristics were estimated using data from Ethiopia's Central Statistical Agency (CSA). Accurate sample size calculations were conducted for each sub-city and study site to ensure comprehensive coverage. The determination of the household sample size involved applying the formula $n = (z^2pq) / d^2$: $n = (1.96)^2(0.5)(0.5) / (0.05)^2$, $n = 384$. This yielded a sample size of 384 households, distributed across the study areas as shown in Table 3.2. The confidence level (z) was established at 95%, with estimated population characteristics (p) assumed to be 0.5, and the margin of error (d) set at 0.05. This method ensures a reliable and statistically sound sample size for the subsequent data collection and analysis, aligning with established standards in survey research. In the sampling process, a systematic random stratified sampling method was utilized. The sampling interval (K) was determined through the formula $K = nN$, where N represents the population size, and n is the sample size. This approach involved selecting every 'K' element within the population, commencing from a randomly chosen starting point. The systematic nature of the sampling ensures a representative and structured approach to data collection, enhancing the validity of the study's findings. In implementing stratified sampling, the aim was to guarantee comprehensive representation across sub-cities and different areas. The stratification formula used for calculating the sample size within each stratum was expressed as $n_i = (n/N) N_i$. This method facilitated a meticulous survey population and sample allocation strategy, ensuring a balanced and well-represented distribution of samples across distinct sub-city categories and areas. The utilization of stratified sampling enhances the precision and reliability of the study's findings by considering the diversity within the larger population.

Table 3.1 Sample Size Allocation for Sub-Cities

Name of Sub-City	Targeted Population (houses)	Share of one sub city from targeted population	Study Site	Sample Size (n) (No of houses)
Kir-kos	59,589.80	160.Sc	MCC	81
			MC	81
Bole	83,Sc5.40	Sc3.77	SC	126
			AGJ	96
Total	142,815.20	384		384

Source: Authors, Study site survey data, 2020.

This study combined thematic and descriptive analysis for riAGJus data examination, adopting (Mathison, 2014) methodological framework. Fieldwork pre-testing validated questionnaires and interview guides, enabling iterative refinements to strengthen research design. Systematic tool adjustments ensured conceptual clarity and empirical reliability, enhancing overall validity.

3.7.3 Sampling Technique

In order to ensure representativeness along with diversity in the study, non-probability along with probability sampling techniques were combined. Purposive sampling was employed for recruiting urban planners and stratified random sampling for selecting residents. It ensured the participation of participants that reflected the demographic diversity of Addis Ababa and represented a wide array of ages, gender, and socioeconomic status.

The study area was chosen in two meticulous steps. Stage one utilized a purposive approach in selecting locations vital to the future growth of Addis Ababa, considering the location and the current trend in urbanization. After strict Screening, Kir-kos and Bole Sub-cities were found to be the most suitable choices, as they met all the criteria. A limited simple random stratified sampling technique, which is a probability sampling method, was

utilized during stage two. This method involved the division of the population into distinct strata according to specific characteristics, such as geographic area or socioeconomic status. Random samples were selected at random from every stratum in such a way that all such dwellings had an equal opportunity of being selected, untroubled by external factors.

3.8 Method of Data Collection

A mixed-methods study was employed, using a combination of qualitative and quantitative data collection procedures to offer an integrative interpretation of the research problem at hand. The use of a mixed-methods design is in aligns with Creswell's (2017) guideline, whereby it is desirable to combine qualitative and quantitative approaches in an attempt to explore extensive research problems (Creswell, 2017).

3.8.1 Qualitative Phase

Key informant interviews, and thematic analysis were employed in the qualitative research phase of the study. Purposive sampling was used in participant selection so that they would possess the necessary expertise and experience in urban planning, particularly with regard to Addis Ababa. Data was collected using semi-structured interview guides to obtain flexibility and depth in the answers. Thematic analysis was applied to identify emerging patterns and themes in the qualitative data, underlining the socio-economic, physical, and environmental impacts of MLUP in the study areas. The sampling design included urban planners, members of the neighborhood, and residents of Kir-kos and Bole sub-cities, thus obtaining a good representative sample of opinions (Creswell, 2017; Kloosterboer, 2019).

3.8.2 Quantitative Phase

Quantitative phase utilized questionnaires and surveys to obtain numerical data. The target population included urban planners, residents, and members of the local community from specified locations in Addis Ababa. 54 experts in urban planning (14 key informant and 40 urban planners), and 384 ordinary residents were sampled using application of non-probability

(purposive sampling for urban planners) and probability (stratified random sampling for residents) sampling approaches. This approach ensured variety and representativeness of the sample. Questionnaires had a combination of closed-ended questions, quantified using the Likert Scale, and open-ended questions to gather qualitative data. Statistical methods were used to calculate the sample size, and population estimates of the Addis Ababa City Planning Commission informed the sampling process (AACPPO, 2017a; Neirotti et al., 2014).

3.8.3 Data Collection Instruments

Careful planning ensured reliable and valid data collection. Three key instruments facilitated data gathering: interview guides, survey questionnaires, and observation checklists. A thorough literature review informed the development of study tools, followed by pre-testing to maximize effectiveness. Pilot testing refined survey questionnaire clarity, wording, and phrasing. Further verification occurred through pilot studies and expert consultation, confirming instrument suitability for the research environment (Braun & Clarke, 2006; Creswell, 2017).

Systematic primary data were gathered using interviews, questionnaires, and observations with individuals who had first-hand experience at the Urban Planning office. To complement this primary data, an extensive review of secondary sources was conducted. Secondary data sources employed included Scholarly research, official reports, public documents, and government records (see Appendix-J). This supplementary data collection was a robust contextual foundation, allowing for a more general and in-depth analysis of urbanization in Addis Ababa's MCC, MC, SC, and AGJ neighborhoods.

3.9 Method of Data Analysis

3.9.1 Qualitative Data Analysis

Qualitative data in this study were analyzed using thematic analysis, which is a popular method described by (Braun & Clarke, 2006). To ensure a

systematic approach, guidelines for thematic analysis were prepared, which allowed the data to be structured and interpreted. IBM SPSS Statistics 20 and ArcMap 10.8 software also assisted with the analysis process. Data was coded to identify emerging patterns and themes, which were interpreted in relation to the Study objectives. Analysis specifically aimed to extract the SEPE impacts of the MLUP and document the perceptions of citizens and urban planners. Thematic analysis also provided a systematic rationale for interpretation of textual data from open-ended questionnaire answers and interviews, ultimately arriving at full insights into the qualitative findings.

Thematic analysis, as proffered by Braun and Clarke (2006), provides a systematic approach to identifying patterns and themes in textual data derived from interviews, surveys, and observations. To enhance the simplicity of findings and communication, graphs and tables were used throughout the analysis procedure, following recommendations by (Raubenheimer, 2017; Varachia & Yasseen, 2020). Quantitative-qualitative merged methodology enabled a detailed analysis and evaluation of the contemporary-day impact of MLUP on SEPE advancement in identified areas of Addis Ababa, as supported by (Creswell, 2017).

3.9.2 Quantitative Data Analysis

Quantitative data were processed using statistical software such as SPSS (Halimoon et al., 2021a; Shrestha, 2021) and ArcMap. Descriptive statistics such as frequencies and percentages were used to summarize the data. Advanced statistical techniques, such as quadrat point pattern analysis, Poisson distribution, and Chi-square tests, were employed to examine spatial association and patterns. Use of statistical software reinforced the validity and accuracy of quantitative findings (Creswell, 2017; Halimoon et al., 2021b).

Spatial Analysis Technique: The research area spans 160.29 hectares, with a broad spatial area for intensive analysis. In order to give precision and suitability of the data, a new map following defined standards was developed

on 2 February 2020, which authenticated the correctness of the used data in the study. A sophisticated analytical framework was deployed to deeply investigate the distribution of applications throughout the area. This approach entailed point pattern analysis, spatial arrangement exploration, and statistical intensive testing. Quadrant analysis, with the procedures outlined by (Antônio et al., 2016; Heyne & Fhoteringham, 2020; Neel et al., 2004), was applied to estimate the degree of clustering geographical patterns in the study area, and examine horizontal land use mix. This combination of approaches had its strength in achieving a good and detailed understanding of the spatial process under investigation.

Table 3 2 Houses Surveyed and Quadrat Calculation for GIS Analysis

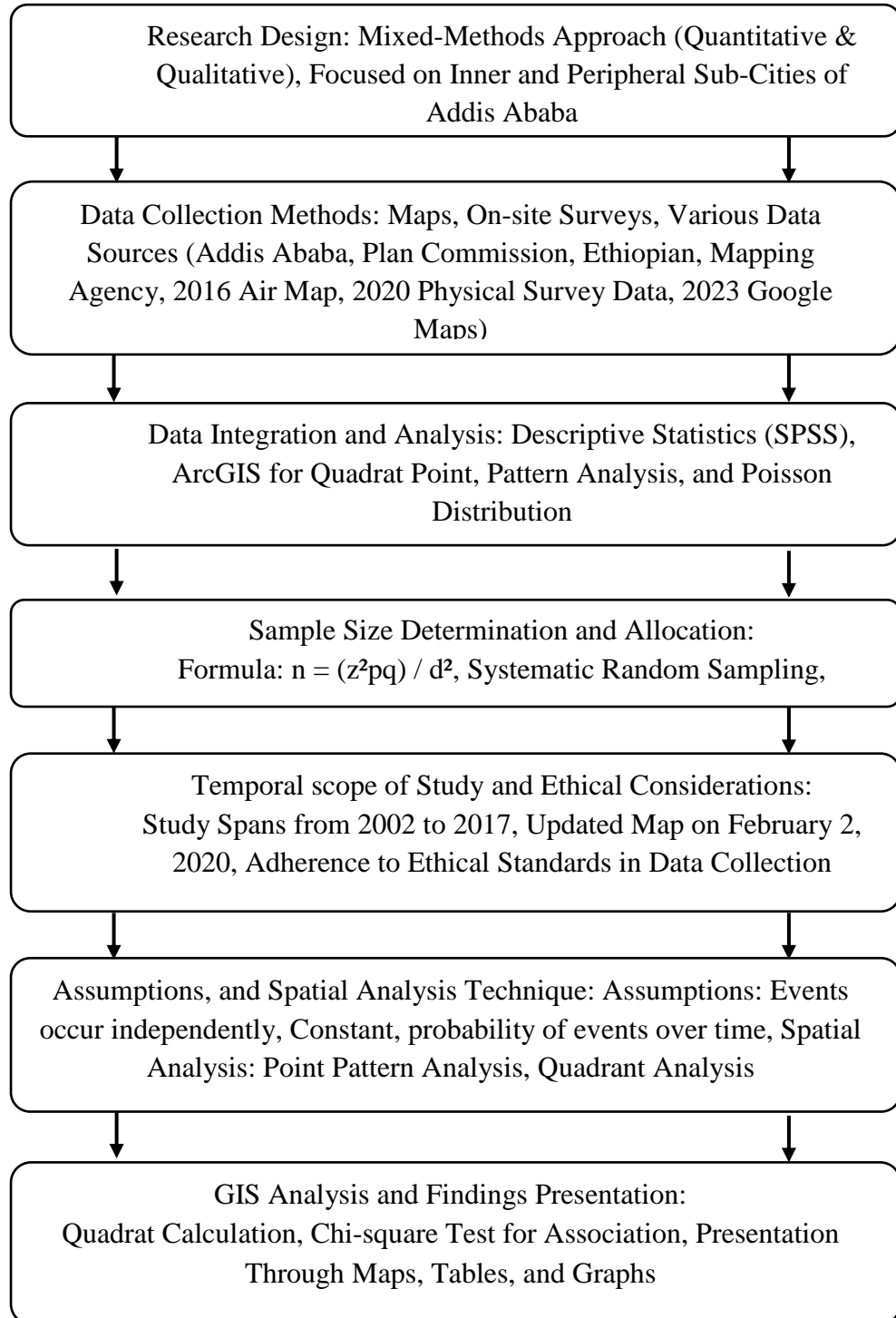
Study Site	Area of the Study Site (in hectares)	Number of Houses (Events) (n)	Area of Quadrant in Sq m	Number of Quadrants
MCC	70.3	81	121	80
MC	25.72	81	126	80
SC	27.55	126	160	80
AGJ	36.72	96	99	80
Total	160.29	384	506	320

Source: Authors, Study site survey data, 2020.

The Table 3.2 provides details on the study areas, their respective sizes, the number of surveyed houses, and the parameters for quadrant analysis. Quadrat size calculations, utilizing square quadrats, ensure a balanced approach in spatial analysis, taking into account crucial factors like quadrant size, cell size selection, and grid placement. The quadrant analysis, based on spatial arrangement and statistical examinations, categorizes point distributions as clustered, uniform, or random.

The study employs a Chi-square test to determine the significance of associations, focusing on the distribution of land use types (mixed, residence, commerce) within four areas: MCC, MC, SC, and AGJ. In addition, the

study utilizes SPSS software to investigate the relationship between geographical locations and functional categories, classifying functions into three primary groups: Mixed, Residential, and Commercial. Commercial functions include entities such as banks and retail stores, residential functions



consist of apartments and standalone homes, while mixed functions

Figure 3.4 Comprehensive flowchart of the research method, Source: Author.

encompass that blends multiple uses into one space where those functions are to some degree physically and functionally integrated

This flowchart outlines the key steps and components of the research methodology for Objective one (the spatial distribution of urban land use), from the research design to the presentation of findings. It shows the logical flow of the processes involved in the study.

3.10 Method of Data Presentation and Validation

3.10.1 Data Presentation

Results were presented in a blend of tables, graphs, and maps to assist with clarity and aid interpretation. Descriptive statistics were listed in tables, and spatial trends mapped using ArcMap. Findings of thematic analysis were synthesized into words with the assistance of direct participant quotes. Multimodal presentation in this way assisted in making findings accessible to a blended audience of policymakers, urban planners, and researchers.

3.10.2 Validation

The study employed a number of measures to validate the data, such as data triangulation (observation, questionnaires, and interviews) and cross-validation of findings using qualitative and quantitative analysis. Ethical procedures such as informed consent, anonymity, and data protection were rigorously followed. Ethical clearance was obtained from respective institutions, and confidentiality of answers was guaranteed to the participants. Such precautions ensured the findings of the study were credible and reliable (Creswell, 2017; Gorard, 2015).

Data Testing: The research topic exhibits a methodologically rigorous approach to testing research assumptions, which includes critical analysis of multiple dimensions such as data shape and distribution, sample independence, variance homogeneity, data linearity, outlier presence, and multicollinearity. To establish the validity of these assumptions, the statistical tests specified by Creswell were thoroughly applied. The chosen tests, such as the Shapiro-Wilk

test for data distribution, Levene's test for variance homogeneity, Mahalanobis distance for outlier detection, and Cronbach's alpha for detecting multicollinearity, demonstrate the research's methodological soundness (Creswell, 2017).(see Appendices B, Table 10-13)

The study also used non-parametric Freedman ANOVA testing, guided by the Shapiro-Wilk test results, with post-hoc analysis using Kendall's coefficient of concordance (W). These extra tests increased the investigation's depth, notably in the study of effect size and significance, as seen by the thorough data reported in Appendix A, Tables 1 up to 9.

The dual-source data gathering technique used interviews, questionnaires, and observations to gather primary data from urban planning specialists (See Appendix –H), residents, and local community members (see Appendix - G). In addition to this main data, secondary data from Addis Ababa City Planning Commission offices and other sources enriched the inquiry, resulting in a well-rounded and comprehensive dataset (see Appendix - J).

3.10.3 Ethical Concerns

Ethical issues, such as informed consent, confidentiality, and data protection, were dealt with in the research process. Participants were given detailed information about the study and their rights, and written consent was obtained before data collection. Data were anonymized to protect participants' identities, and the access to data was restricted to the research team. Ethical clearance was obtained from the respective institutional review board, and the study adhered to ethical principles (Creswell, 2017).

CHAPTER FOUR: RESULTS

4.1 Response Rates and Key Findings

This subsection addresses the demographic profiles of urban planners, experts, informants, and inhabitants across the study areas (see Appendices A, C, and D for full datasets), analyzing the impact of the MLUP on SEPE development. It compares the relative effects of locational variables and MLUP regulations, assesses urban planners' perceptions of SEPE outcomes, and explores the influence of the UMLP on SEPE development. Furthermore, it identifies root causes of MLUP implementation challenges and their consequences for SEPE, integrating quantitative demographic data with qualitative policy insights to present a comprehensive analysis.

4.1.1 Demographic profile of planners and professionals.

Table 4.1 Planners' and professionals' education and demographics.

Location	Frequency	Percent
Main city Center	10	20.0
Main corridor	11	Sc.0
Secondary corridor	12	24.0
AGJ	11	Sc.0
Gender		
Male	35	70.0
Female	9	18.0
Age		
18 up to 30	29	58.0
31 up to 60	14	28.0
above 61	1	2.0
Academic background		
Diploma	1	2.0
Degree and above	43	86.0
Occupation		
Unemployed	6	12.0
Government employee	28	56.0
Self-employee	10	20.0

Profession		
Urban and regional Planner	2	4.0
Urban planner	14	28.0
Architect	9	18.0
Architect Planner/Housing expert	4	8.0
Urban planner and developer	3	6.0
Others	10	20.0
Not specify	2	2.0
Work experience in years		
Graduate	5	11.4
Two up to five	8	18.2
Six up to ten	15	34.0
Eleven up to Fifteen	11	25.0
Sixteen up to twenty	5	11.4
Total	44	100

4.1.2 Demographic profile of Households

Table 4.2 Demographic Characteristics of the Household Sample.

	MCC		MC		SC		AGJ	
	Gender							
	Fre que ncy	Perce ntage	Fre que ncy	Perce ntage	Fre que ncy	Perce ntage	Fre que ncy	Perce ntage
Male	43	53.1	43	53.1	63	49.2	51	52.1
Female	38	46.9	38	46.9	65	50.8	45	46.9
Total	81	100	81	100	128	100	96	100
	Age of respondents							
18-27	21	25.9	43	53.1	39	30.5	30	31.3
28-37	33	40.7	25	30.9	45	35.2	40	41.7
38-47	14	17.3	6	7.4	22	17.2	16	16.7
48-57	8	9.9	1	1.2	16	12.5	6	6.3
58-67	3	3.7	1	1.2	3	2.3	2	2.1

68-77	2	2.5	0	93.8	1	0.8	2	2.1
Missing System	0	0	5	6.2	2	1.6	0	0
Total	81	100	81	100	128	100	96	100
Education								
Illiterate	1	1.2	2	2.5	4	3.1	2	2.1
Read and write	2	2.5	4	4.9	6	4.7	1	1
Grade 1 up to 8	9	11.1	9	11.1	11	8.6	9	9.4
Grade 9 up to 12	13	16	7	8.6	12	9.4	14	14.6
Diploma	32	39.5	32	39.5	54	42.2	37	38.5
Degree and above	24	29.6	26	32.1	41	32	33	34.4
Missing System	0	0	1	12	0	0	0	0
Total	81	100	81	100	128	100	96	100
Job Status								
Business	5	6.2	16	19.8	20	15.6	29	30.2
Engineering (graphics, Artist)	5	6.2	1	1.2	6	4.7	3	4.1
Social Science (economist, accountant,)	3	3.7	3	3.7	12	9.4	12	12.4
Secretarial, Social Work	6	7.4	3	3.7	7	5.5	18	18.8
Others (Driver, teachers)	12	14.7	2	2.5	7	5.4	13	13.6

Healthcare Professionals	0	0	1	1.2	9	7	0	0
Students	12	14.8	8	9.9	5	3.9	4	4.2
No job	0	0	4	4.9	13	10.2	0	0
No response	38	46.9	43	53.1	44	34.4	16	16.7
Total	81	100	81	100	128	100	96	100
House hold size								
Single	4	4.9	7	8.6	6	4.7	12	12.5
Paired	16	19.8	8	9.9	13	10.2	7	7.3
Three	16	19.8	18	Sc.2	21	16.4	23	24
Four	10	12.3	19	23.5	24	18.8	15	15.6
Five	6	7.4	21	25.9	27	21.1	13	13.5
Six	5	6.2	6	7.4	21	16.4	15	15.6
Seven	4	4.9	1	1.2	8	6.3	7	7.3
Eight and above	4	4.9	1	1.2	8	6.3	4	4.2
No response	16	19.8	0	0	0	0	0	0
Total	81	100	81	100	128	100	96	100
House ownership								
Government	26	32.1	4	4.9	10	7.8	0	0
Private	16	19.8	16	19.8	42	32.8	8	8.3
Kebele/ Public	24	29.6	25	30.9	39	30.5	52	54.2
Rental House	14	17.3	36	44.4	36	28.1	33	34.4
Others	1	1.2	0	0	1	0.8	3	3.1
Total	81	100	81	100	127	100	96	100

4.1.3 Demographic profile of key informants

Table 4.3 The demographic composition of key informants

No	Expert	Responsibility	Level of Education	Years of experience
I. Addis Ababa plan commission office				

1	Senior planner	city planner	Ms	12
2	Senior Planner	Spatial Planning Department head	Ms	9
3	Senior Planner	D manager, Campus AEPED Consulting Plc	Ms	36
4	Senior Planner	Expert, Team leader, Managing Director, General Manager, Commissioner	PhD	37
5	Senior Planner	Land administration office head	Ms	30
6	Senior Civil Engineer	Infrastructure Department head	Ms	17
7	Senior Civil engineer	Infrastructure team leader	Ms	8
8	Senior Planner	Manager, lecturer, expert, Consultant	Ms	35
9	Senior Planner	Manager, lecturer, expert, Consultant	Ms	37
10	Senior Planner	Expert, Team leader, Managing Director	Ms	33
II. Bole sub city Planning Office				
1	Urban Planner	City administrative team leader	Bs	5
2	Urban Planner	Senior spatial and GIS expert	Ms	7
III, Kir-kos sub city planning office				
1	Urban Planner	City administrative team leader	Ms	8
2	Urban Planner	Junior Planner	Bs	4

4.2 Exploration of the Impacts of MLUP on SEPE Development

This study examined the impacts of the MLUP on SEPE development in MCC, MC, SC, and AGJ. The analysis of land-use changes and spatial distribution—focusing on residential, commercial, and mixed-use functions—revealed inconsistencies and a lack of functional synergy, disrupting effective land-use planning (Figures 4.1–4.5; Table 4.4).

Urban planners' perspectives on SEPE development were evaluated, highlighting key areas of consensus and divergence (Tables 4.5–4.8). Further assessment of MLUP's specific characteristics and effects underscored significant challenges impeding SEPE progress (Figures 4.6–4.16; Tables 4.5–4.8). Finally, an investigation into the root causes of MLUP-related dilemmas identified systemic barriers to sustainable development (Tables 4.13–4.18).

4.3 The Role of Location-Specific Factors vs. MLUP Regulations

The primary objective of this study is to evaluate the distribution of urban functions, investigating whether they are shaped by location-specific factors rather than being directly influenced by mixed planning regulations. While the integration of different functions is often assumed to impact urban settlements, there is limited theoretical and practical understanding of MLUP and MUD. This knowledge gap is particularly relevant in the context of Addis Ababa, the selected study area. While factors such as policy and culture influence urban planning, this research emphasizes the role of location and the distribution of land use types—residential, commercial, and mixed-use areas—as indicators of functional distribution.

The Master Land Use Plan (MLUP) serves as a strategic urban management framework designed to integrate diverse land use functions in a mutually supportive manner. This study employs point pattern analysis and chi-square tests to evaluate the influence of geographic location on Mixed Use Development (MUD) within Addis Ababa. While theoretical conceptions of MUD differ significantly from practical implementations, this research specifically tests the hypothesis that the spatial distribution of urban functions

occurs independently of one another, with uniform probability across the study area.

To test this hypothesis, the study analyzed changes in land use and their spatial distribution, focusing on residential, commercial, and mixed-use functions. The findings revealed that these functions are inconsistently distributed and not mutually supportive, resulting in disruptions to land use planning. These conclusions are supported by visual and statistical evidence presented in Figures 4.1 to 4.5 and Table 4.4.

4.3.1 Spatial Distribution of Functions (Mixed, commerce and residence)

Urban areas have unique land uses and development paradigms. In the study areas (MCC, MC, SC, AGJ), the land use type is usually a mixed of residential with commercial-type. The general Scenario of land use planning is adapted as the mixed development. However, such land use development is taking place with shallow legal and policy background that frame the plan. Hence, under this sub section, the results concerning challenges of the MUD, distribution of functions mainly residential, commercial and mixed which are not consistent and mutually supportive each other, resulting disturbances in the land use planning.

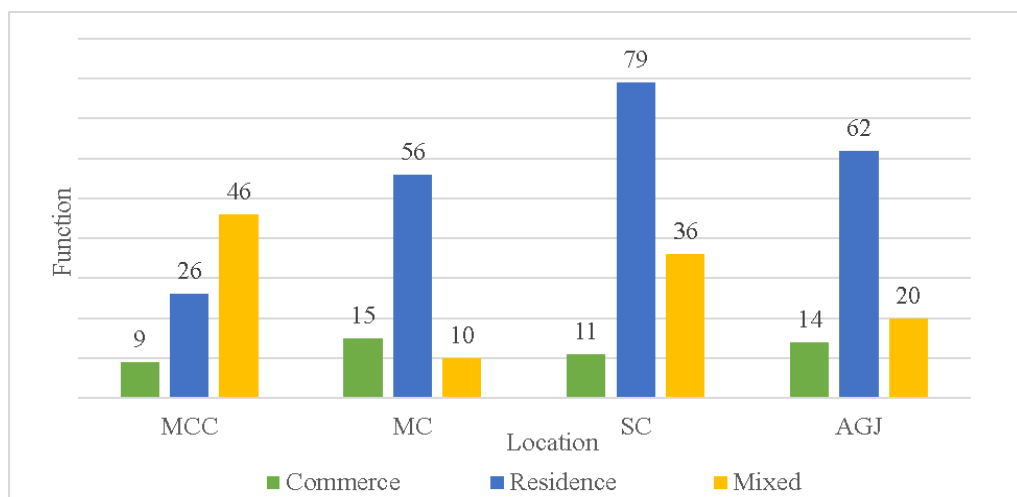


Figure 4.1 The distribution of function (commerce, residence and mixed) on study areas, Source: Author, own site survey, 2020

4.3.2 The Relationship between location and distribution of functions

Chi-square statistics were employed to explore the relationship between location and the distribution of functions (Mixed, Commerce, and Residence). At the 5% significance level, our analysis reveals a noteworthy connection between location and the current function at the specified site ($\chi^2 = 47.763$, $df = 6$, $p = 0.001$). Notably, the statistical chi-square value greatly exceeds the tabulated critical value (i.e., $47.763 > 12.592$), providing substantial evidence to reject the null hypothesis (H_0). Consequently, we cannot accept the null hypothesis, affirming a significant link between location and function. Hence, we find support for H_1 .

Table 4.4 Chi-square statistical test result of location and functional distribution.

Study site	Count	Commerce	Residence	Mixed	Total
MCC	Observed	9	26	46	81
	Expected	10	47	24	81
	χ^2	0.2	9.4	21.2	30.8
MC	Observed	15	56	10	81
	Expected	10	47	24	81
	χ^2	2.1	1.7	7.9	11.7
SC	Observed	11	79	36	126
	Expected	16	73	37	126
	χ^2	1.6	0.5	0.0	2.1
AGJ	Observed	14	62	20	96
	Expected	12	56	28	96
	χ^2	0.3	0.7	2.3	3.2
Statistical Chi square				χ^2	47.763
Degree of freedom (df) = (r-1) *(c-1)				df	6.000
Statistical tables Chi square value				χ^2	12.592

Source: Author, study site survey data, 2020.

The analysis yielded a p-value below 0.05, indicating no statistically significant difference between the observed spatial pattern and the expected distribution under the Complete Spatial Randomness (CSR) null hypothesis. An effect size analysis quantified these differences, revealing a small-to-medium effect size (Cohen's $d = 0.353$). These results demonstrate that geographic location exerts a measurable, though modest, influence on functional distribution patterns.

The study revealed that, in a specific metropolitan region in (MCC, MC, SC, AGJ), location has more weight over functional distribution than the Mixed land use theoretical planning and development framework, as well as its related clear standards and laws. The study aims to test and appraise the practical use of MLUP in accordance with theoretical frameworks. Furthermore, the study examines the chosen area's planning and development rules, as well as regulatory mechanisms. In contrast to the null hypothesis suggesting a negative correlation between location and functional distribution, the results reveal that pure residential functions exhibit a more Scattered distribution when compared to mixed and commercial types of use, as depicted in Figure 4.1 The analysis, employing Pearson's correlation coefficient, shows a weak negative correlation between location and functional distribution ($r = 0.123$). Moreover, there is no significant association between function and location ($r = -0.516$). These findings imply that functions are distributed in a seemingly arbitrary and unrelated manner. Conversely, functional distribution appears to be relatively unaffected by the specific location.

The research first examined Mixed-Use Development (MUD) through spatial stratification of the area of study. Findings indicate that spatial position plays a stronger function in determining functional distribution than Master Land Use Plan (MLUP) regulation or theory. Findings also indicate, however, that functions display an irregularly distributed, seemingly random pattern in the area of study.

4.3.3 Point Pattern Density (Poisson Distribution)

Figures 4.2 through 4.5 present the quadrat analysis results generated through ArcGIS software. These outputs include point pattern density (considered houses as points), the distribution of houses observed within the designated quadrats, and the Poisson distribution.

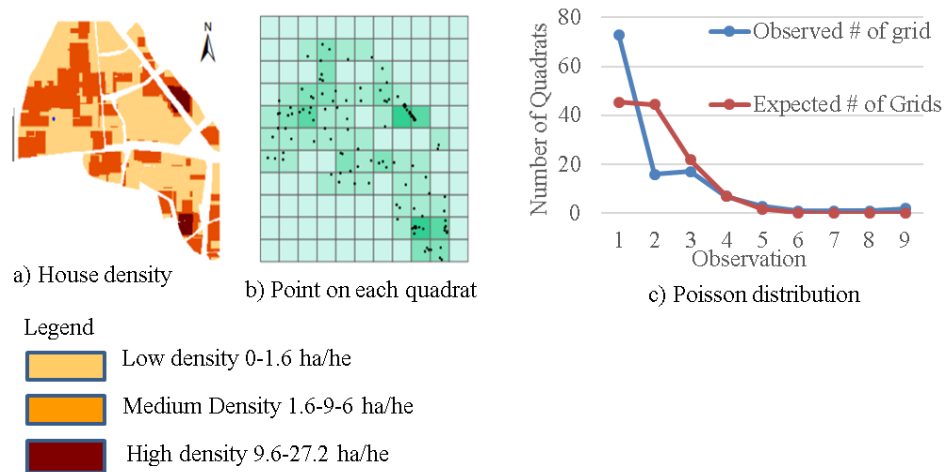


Figure 4.2 MCC Quadrat Analysis, Source: study site survey data, 2020.

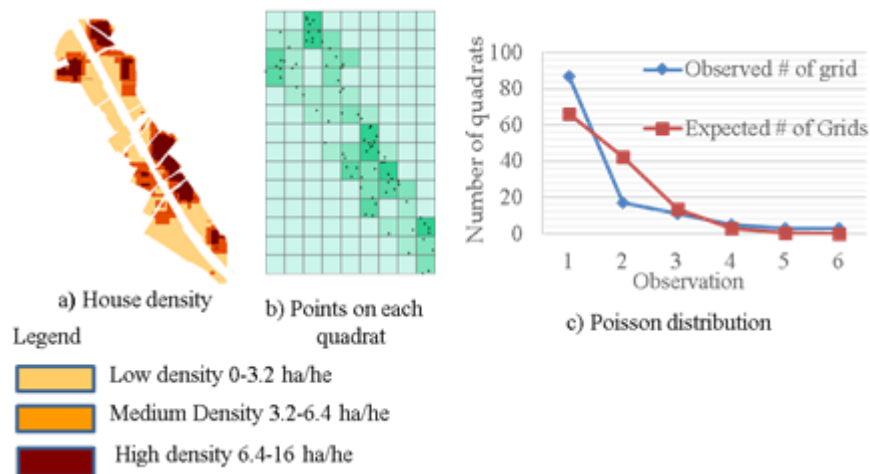


Figure 4.3 MC Quadrat Analysis, Source: study site survey data, 2020.

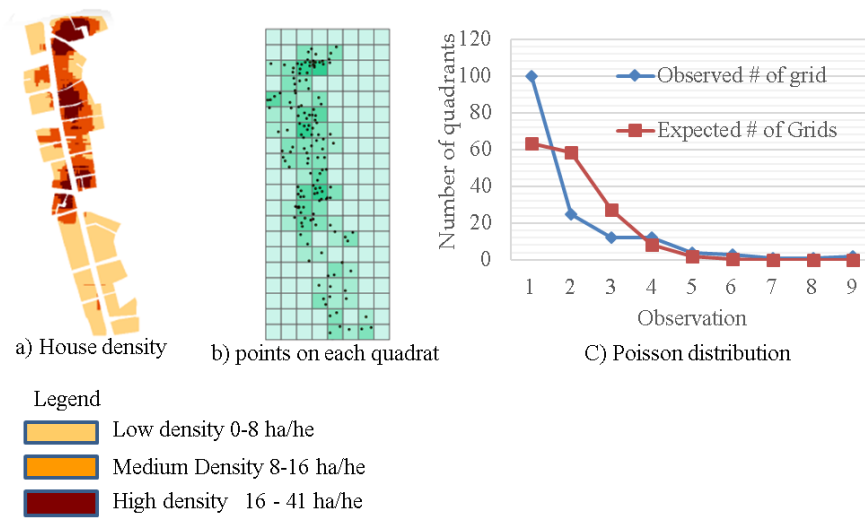


Figure 4.4 SC Quadrat Analysis, Source: study site survey data, 2020.

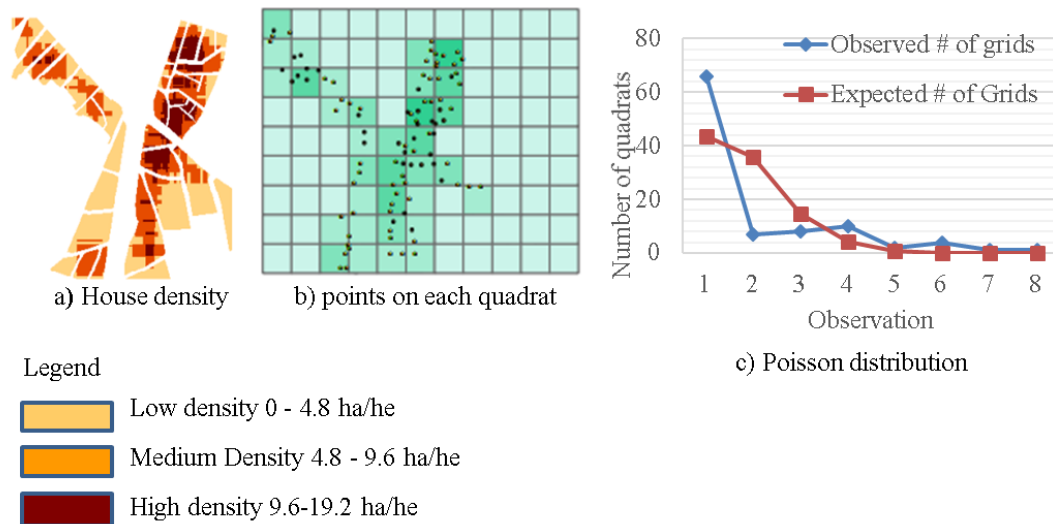


Figure 4.5 AGJ Quadrat Analysis, Source: study site survey data,

Generally, the goal of this research points to the complexity of the distribution of urban functions in Addis Ababa, demonstrating that location is a more significant determinant than theoretical constructs and provisions of the MLUP. The findings indicate that urban functions are distributed in a seemingly random and independent manner, rather than being closely aligned with MLUP principles. The chi-square analysis confirms a statistically significant relationship between location and functional distribution,

emphasizing the need for a more nuanced understanding of how spatial factors influence urban development. While the study provides valuable insights into the current state of MUD in Addis Ababa, it also underscores the importance of considering a broader average of factors in future research. The results suggest that effective urban planning in Addis Ababa requires a more integrated approach that goes beyond mere location-based analysis, incorporating policy, cultural, and socio-economic dimensions to achieve a more balanced and sustainable urban development.

4.4 Urban Planners' Perspectives on SEPE Development

In this second objective I examine Planners have expressed their perspectives on the significance of these factors, using a Likert Scale to indicate their levels of agreement or disagreement. subsequently, they have shared their observations and findings regarding the outcomes they have encountered during the evaluation process. In the following section, you will find a set of evaluation queries (EQ) covering various aspects of social, economic, physical, and environmental development further, see Appendix F in supplementary document.

4.4.1 Social Development Perspectives

Table 4.5 Social development frequency (%) at MCC, MC, SC, and AGJ.

EQ of social development	SD	D	UN	A	SA
MUD has successful in current social development.	10.0	30.0	Sc.5	30.0	7.5
MUD favor some group of the city dwellers.	12.	12.5	25.0	35.0	15.0
MUD is maximizing the social development result in minimum cost.	7.5	20.0	30.	Sc.5	20.0
MUD is highly dependent on and intertwined with the norms, values, and cultures of a society.	12.5	15.0	27.5	30.0	15.0

The implementation of MUD has high degree of social acceptability.	5.0	17.5	25.0	40.0	12.5
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The aspect with the most unanimous agreement is that the introduction of MUD is widely accepted socially.

4.4.2 Economic Development Perspectives

Table 4.6 Economic development frequency (%) at MCC, MC, SC, and AGJ

EQ of economic Development	SD	D	UN	A	SA
MUD has a negative effect in economic development.	17.5	32.5	Sc.5	20.0	10.0
MUD has created vibrant and active economy in study area.	17.5	35.0	20.0	Sc.5	5.0

The most notable point of contention revolves around the notion that MUD has failed to effectively contribute to the development of a thriving and prosperous economy in the study areas.

4.4.3 Physical Development Perspectives

Table 4.7 Physical development frequency (%) at MCC, MC, SC, and AGJ .

EQ of physical development	SD	D	UN	A	SA
The objectives of MLUP were frame the planning instruments.	7.5	5.0	17.5	50.0	20.0
MLUP is the most important type of planning in the Addis Ababa environment.	7.5	10.0	30.	27.5	25.0
MLUP improperly allocate the best function at a given point.	2.5	17.5	Sc.5	40.0	17.5
MLUP is likely the most suitable approach to land use and development in the context of Addis Ababa.	5.0	12.5	20.0	Sc.5	40.0

The items with the highest consensus and strong agreement predominantly center on the notion that the primary objective of MLUP was to influence the urban land use planning approach. Additionally, there is a widely held belief that MUD represents the dominant form of urban land use development within the framework of Addis Ababa city.

4.4.4 Environmental Development Perspectives

Table 4.8 Environmental development frequency (%) at MCC, MC, SC, and AGJ

EQ of Environmental Development	SD	D	UN	A	SA
Controlling the type of use, in study area is difficult.	10.0	20.0	12.5	45.0	12.5
There is an unclear mixed-use environmental implementation regulation in the study area.	0.0	15.0	17.5	35.0	32.5
MUD has a negative effect on environment.	0.0	10.0	32.5	47.5	20.0
MUD has environmental inequality in the same and different generation.	0.0	17.5	32.5	19.5	20.0

The point with the most consensus is that, in the selected study area, Urban MUD lacks clear environmental regulations and negatively affects the environment.

The findings of this study reveal several key insights into the MLUP and MUD on various aspects of urban development in Addis Ababa. While planners generally agree that MLUP has significantly influenced urban land use, its effectiveness in SEPE dimensions is less clear. The study shows a strong consensus that MUD is socially acceptable and integral to Addis Ababa's development framework. However, there is notable disagreement regarding its economic benefits, with many expressing concerns that MUD has not fostered a vibrant economy in the study area. Environmental concerns are also prominent, with widespread agreement that unclear regulations and negative

environmental impacts are significant issues. Despite the valuable insights provided, the study is limited by its reliance on subjective perceptions captured through Likert Scale assessments, which may not fully capture the complexities of MLUP and MUD's impacts. Moreover, the study's findings are context-specific to Addis Ababa, limiting their generalizability. Overall, the results underscore the need for clearer regulations and a more balanced approach to integrating SEPE considerations in urban planning.

4.5 Explore the Impact of UMLP on SEPE Development

Based on objectives one and two, this study explores the effects and specific nature of MLUP, assesses its significant challenges, and evaluates its impact on SEPE development. To achieve these goals, the analysis first examines the specific impacts of MLUP, focusing on factors such as travel distance, travel patterns, transportation modes, types of mixed land uses, and travel time. Additionally, it evaluates the broader development of mixed-use areas, addressing challenges such as misconceptions about MUD and the issues these misconceptions create in subsequent development processes. These variables are carefully analyzed to uncover significant challenges stemming from misunderstandings of MUD, followed by identifying the impact of MLUP on SEPE development. The perspectives of respondents, including planners, residents, local community members (customers, pedestrians, and drivers), and key informants, are also considered.

4.5.1 Urban MLUP Effects and Characteristics in Selected Area

Data collection targeted residents and the broader community, encompassing customers, pedestrians, and drivers. A meticulously designed set of evaluation questions guided the investigation into MLUP's impact on SEPE development across MCC, MC, SC, and AGJ. These inquiries explore various factors, including the proximity and frequency of departures from residential areas, modes of transportation, disruptive land use patterns, persistent challenges associated with urban mixed land use, the time required to access the study site, engaging activities, attitudes during visits, walking-related constraints, and the obstacles faced by drivers concerning navigation, stopping, parking, and shopping within the research zone. These four groups of respondents provide

detailed answers to each significant evaluation question, elucidating their findings (see Appendix G in supplementary document).

Residences:

Residence refers to individuals who live within a given locality or area, typically those who have established a permanent home within a certain community. The following issues were analyzed and presented as findings in the study area: a) travel distance of the residents outside the neighborhood, b) travel rate of the residents, c) modes of transport used by the residents in the study area, d) functions or activities disrupting the study areas, and e) problems currently facing MUD.

a) Travel distance of residents outside their neighborhood,

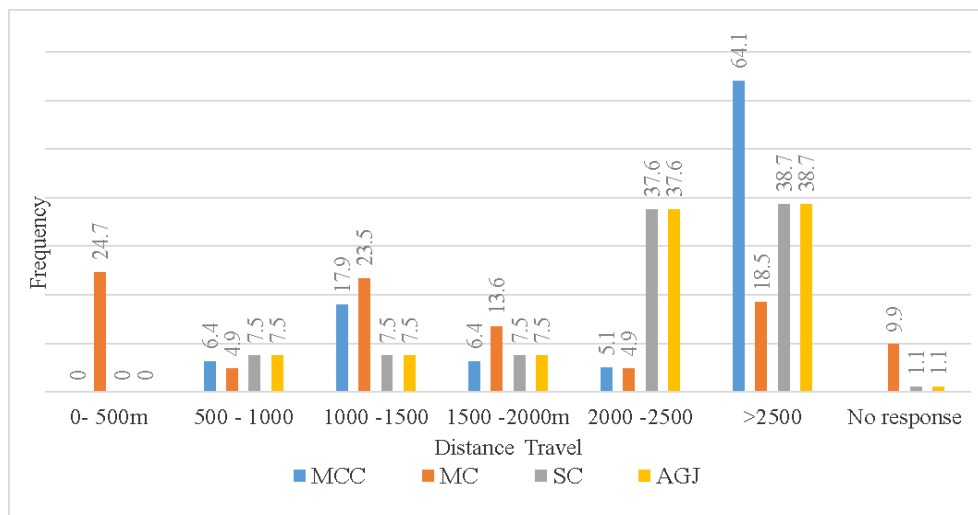


Figure 4.6 Distance travel, residence outside their neighborhood meter/ day.

As depicted in Figure 4.6 residents covered a daily average of 2000 to 2500 meters in their travels. Interestingly, MCC residents recorded the longest average distance, at around 2500 meters. Following closely were AGJ and SC residents, both accounting for 38.7% of the total daily travel distance.

b) Travel rate of the residents

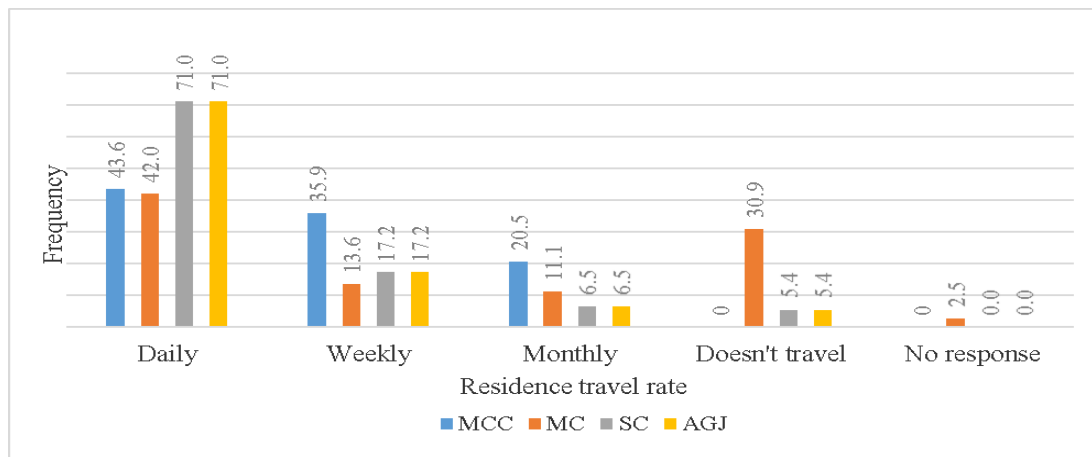


Figure 4.7 Residence travel rate

As seen in figure 4.7 residence travel daily. Notably AGJ and SC has highest residence travel rate of 71% of both. MC and MCC have lower residence travel rate 43.6 and 42.0% respectively.

c) Modes of transport used by the residents in the study area,

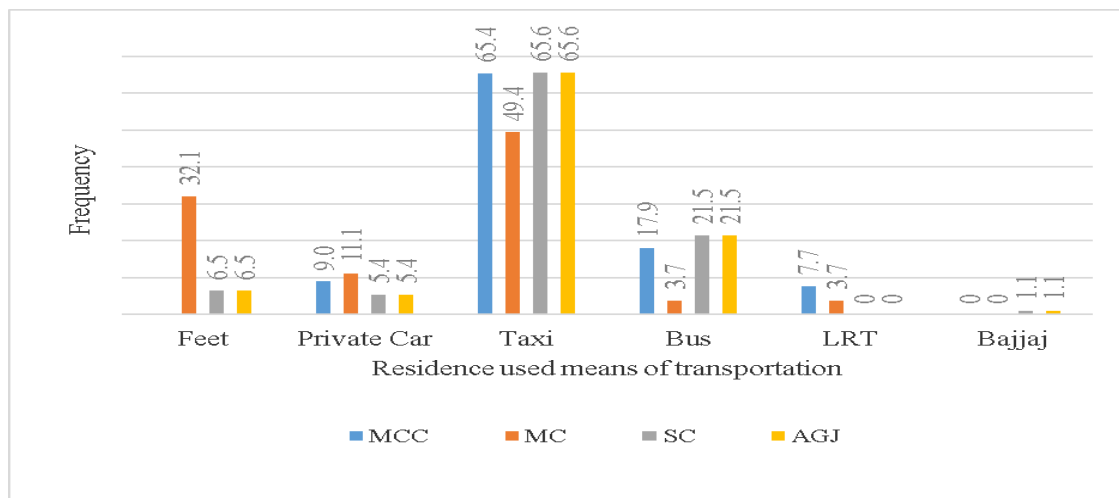


Figure 4.8 Percentages of Residence used means of transportation in study area.

It's clear from Figure 4.8 that there's a noticeable trend in most of the selected study areas where residents prefer using taxis as their primary mode of transportation, as opposed to buses, private cars, or walking. More specifically, in the MCC, SC, and AGJ regions, a larger percentage of residents opt for taxis compared to MC, with proportions of 65.6% and 49.4%, respectively.

d) Functions or activities disrupting the study areas,

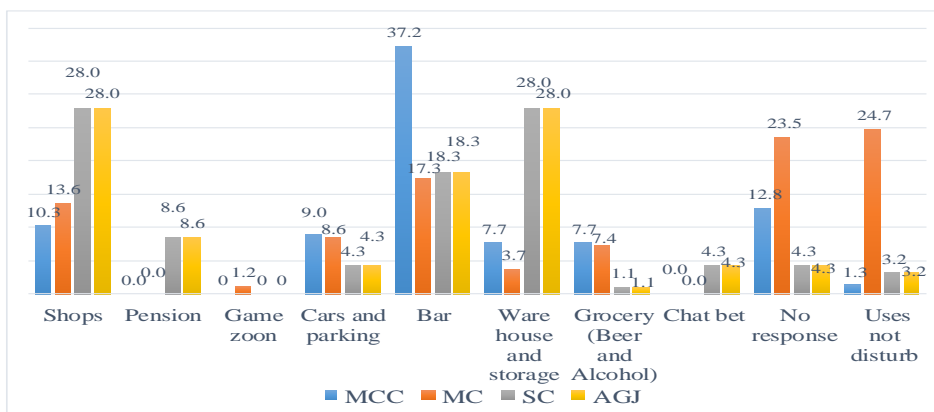


Figure 4.9 Functions or activities that are disturbing the neighborhood.

In Figure 4.9 we can see the factors that commonly cause disturbances for residents. Warehouses and nearby shops stand out as significant disruptors. In the MCC area, approximately 37.2% of residents reported disturbances related to bars. In SC and AGJ, shops and warehouses were identified as primary sources of disturbance, accounting for 29%, while bars contributed to 18.3% of residential disturbances in these regions.

e) Problems currently facing MUD.

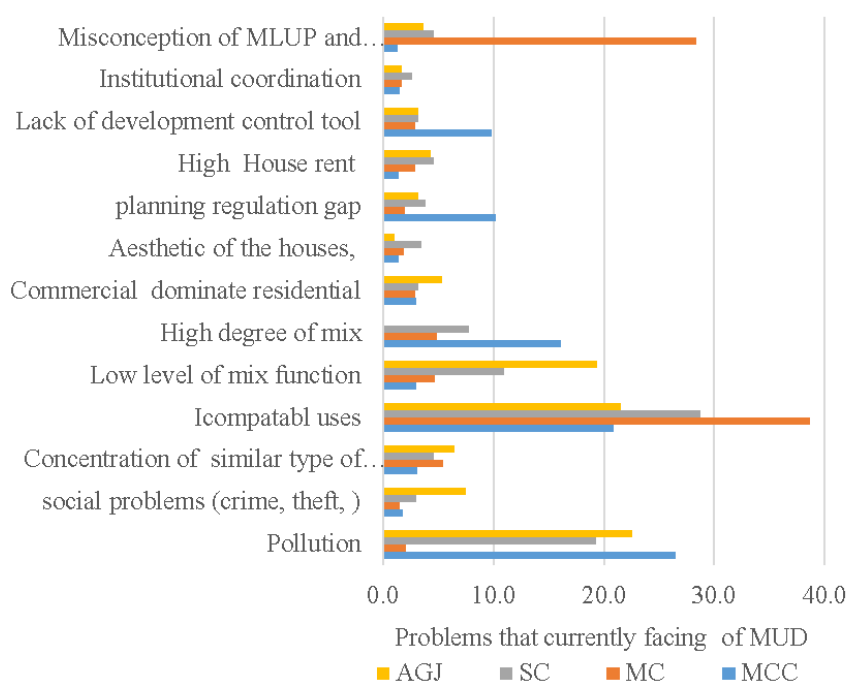


Figure 4.10 Current problems facing mixed land-use development.

Figure 4.10 sheds light on the prevailing challenges that residents currently encounter. These challenges notably include a lack of understanding regarding MUD and issues related to pollution. In MC, approximately 38.7% of residents' experience problems linked to incompatibility, while about 28.4% grapple with the misinterpretation of MUD. Conversely, in MCC, pollution emerges as the foremost challenge associated with MUD, affecting all the selected study areas, while issues of incompatibility also cut across these regions.

Customers:

The entities or groups of individuals that purchase goods or services from a business firm or service establishment. In community perspective, customers may refer to people engaged in transactions with local businesses. The below variables such as Activity attract individuals towards to the research site, means of transport used, and time taken to reached from home to research sites. are used to indicate the impact of MLUP on development.

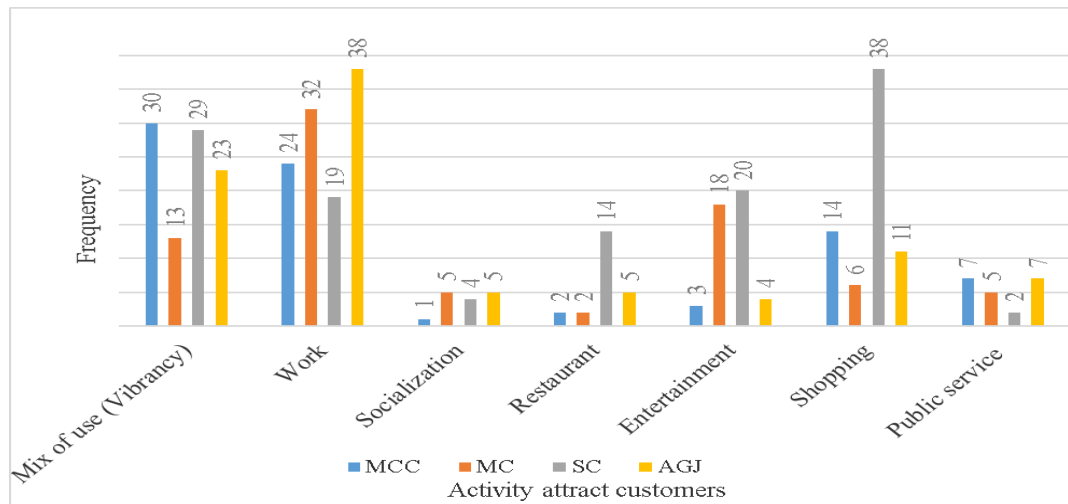


Figure 4.11 Activity attract customers to move toward to the study area.

In Figure 4.11, it's evident that mixed-use areas and shopping destinations have a strong appeal to customers due to their proximity to work locations. Specifically, in AGJ, work-related places, and in SC, shopping areas, attract a substantial customer base, accounting for 38% of the total.

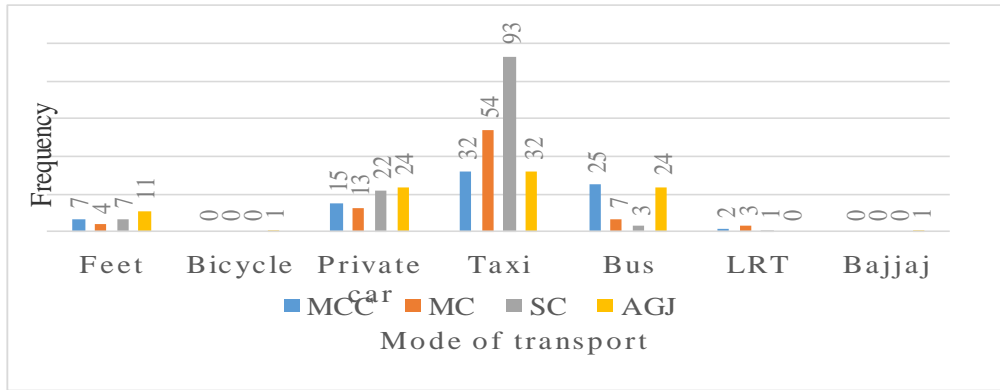


Figure 4.12 Consumer used means of transportation in study area.

Percentages of consumer used means of transportation in study area It's clear from Figure 4.12 that there's a noticeable trend in most of the selected study areas where customers prefer using taxis as their primary mode of transportation, as opposed to buses, private cars, or walking. More specifically, in the, SC and MC regions, a larger percentage of residents opt for taxis compared to SC and AGJ, with proportions of 93%, 54 and 32%, respectively.

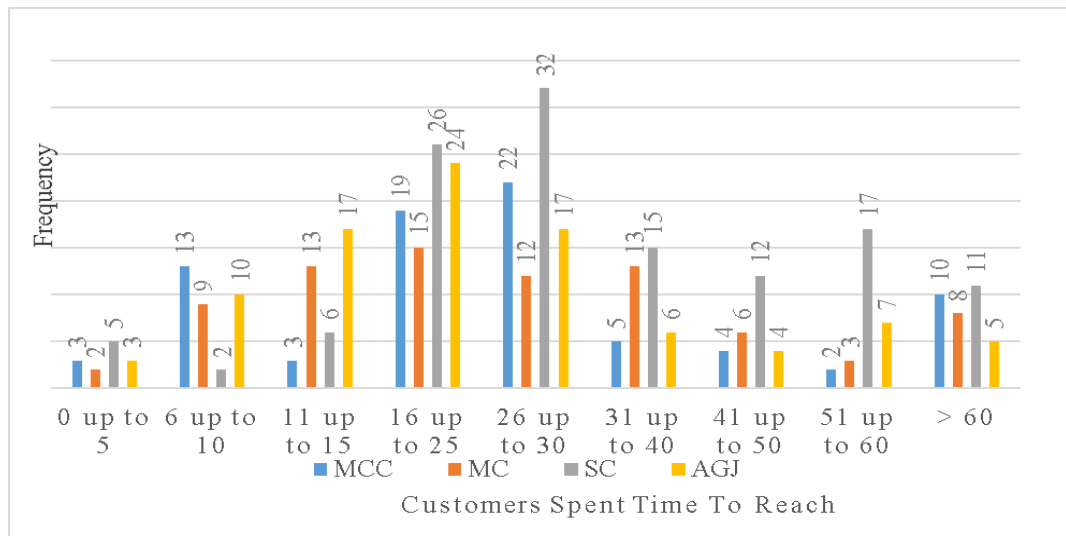


Figure 4 13 Customer travel time to study sites (minutes)

Figure 4.13 illustrates the average customer time spent, predominantly falling within the 15 to 30-minute average. Notably, in SC, 32% of customers fit this timeframe. Moreover, in AGJ and MCC, customers tend to spend more time, with figures of 24% and SC% respectively.

Pedestrians:

People that travel by walking, usually by the sides of sidewalks or walking zones, and avoid using powered vehicles. Pedestrians play a significant role in the city urban life, engaging in various dynamics of the public space. To analyze the impact of MLUP towards selected study area, look at what Activity/uses are attracting pedestrians to come to visit the study area., and make the pedestrians feel uneasy in study are.

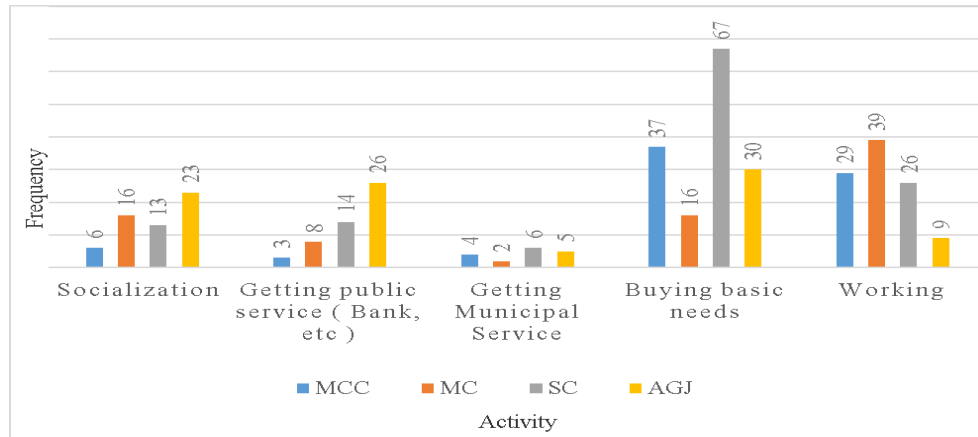


Figure 4.14 Activity attract pedestrians to come to the study area.

Figure 4.14 displays that, apart from MC, the primary activity attracting pedestrians is purchasing essential items, closely followed by work-related activities. In SC, a significant 67% engage in buying basic necessities, while in MC, 39% encounter issues associated with work related matters.

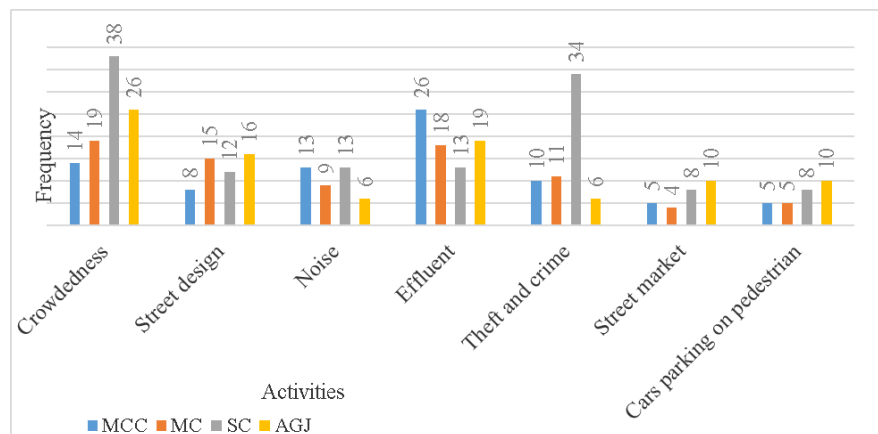


Figure 4 15 Factors contributing to pedestrian diScomfort in study areas:

In Figure 4.15 a general trend emerges: activities causing discomfort among pedestrians are more prevalent in SC compared to AGJ and MCC. Notably, in

SC, concerns about theft and crime account for 34%, followed closely by crowdedness at 38%.

Drivers: Individuals who operate vehicles, such as cars, trucks, or motorcycles, for transportation purposes.

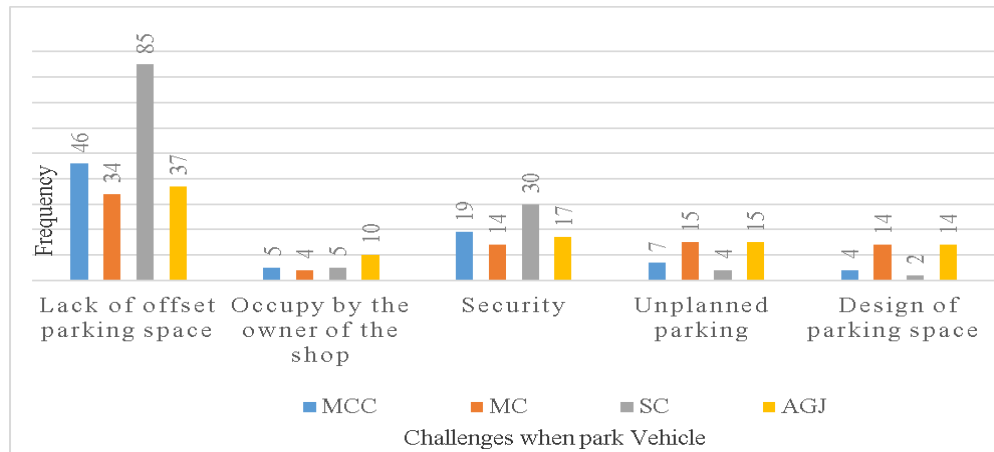


Figure 4.16 Challenges drivers face when parking at an angle.

Figure 4.16 a depicts challenges encountered by drivers when parking cars off the main street on a permanent basis. Notably, in SC, security issues (30%) prevail, followed by a significant lack of available offset parking space (85%). In contrast, in MCC, the figures are 19% for security concerns and 46% for insufficient offset parking space.

To validate the initial interview and observation data, a follow-up round of interviews and observations engaged residents, customers, local community members, and vehicle drivers in the selected study area. Findings revealed that residents regularly traveled more than two hours outside their living areas daily, primarily using taxis and buses. On average, customers took 15 to 30 minutes to reach the study site. Activity attracts and engages. The local community (pedestrians, visitors, etc.) is buying basic human needs and work-related issues. Furthermore, pedestrians and visitors feel unpleasant due to effluent and overcrowding in MCC and AGJ, respectively; most visitors were even spending the whole day in MC and MCC. Major problems such as lack of

parking space, security, and high traffic flow create difficulties when a driver temporarily stops a car on and off the street.

4.5.2 Assessing MLUP's Effects on SEPE Development and Major Challenges

Urban areas demonstrate integrated land use, with development following planning policies. In Addis Ababa, land use patterns have shifted from the traditional mix to zoning restrictions, which embrace a modern balance of residential, commercial, and other uses. However, the effectiveness of such mixed land use is dependent on proper management and adherence to severe norms and regulations. Failure to manage it adequately may have negative developmental repercussions. As a result, this sub objective investigates the effects of mixed land use planning on spatial development—including social, economic, physical, and environmental aspects and assess its significant challenges—in four urban regions (MCC, MC, SC, and AGJ).

Key Informant interview result: Major impacts of MLUP and development
 The Scope of this aim is to assess the overall impact of mixed land-use planning on spatial development—social, economic, physical, and environmental—and assess its primary challenges. Especially, the below-mentioned are highly emphasized: Ownership and Planning Facilitation, Land Policy, Development Dynamics, Mixed-Use Effects, and Environmental Considerations. High priority is assigned to the main city center, primary and secondary development corridors, and periphery zones in Addis Ababa.

Table 4 9 The Major impacts of MLUP and development in study sites

No	Theme	Codes	Excerpts from Transcript
1	Ownership and Planning Facilitation	State facilitation, legal rights facilitation, ownership mix influence, dominance of the planning office, and government	State ownership often has a positive effect on planning since it enables planning without individual opposition or conflicting interests that may be opposed to the public interest.

		control.	
2	Challenges and Complications	State Ownership Issues, License Office Issues, Implementation Issues, Occupation Complications, Land Acquisition Issues, Investment Sufficiency	State ownership makes it difficult for developers to execute their plans.
3	Impact on Development Dynamics	Compensation Impact, Investor Rights Impact, Ownership-Planning Misalignment, Stakeholder Dependence	Balancing remuneration incentives, investor rights, ownership alignment, and stakeholder relationships is critical for determining a company's trajectory and long-term performance.
4	Call for Alternatives	Suggestions for Private Ownership, Free Land System, and Private Ownership Call	A suggestion is made to implement a free landholding system as an alternative to the lease holding system, allowing for more freedom for landholders and flexibility in development.
5	Mixed-Use Effects	Encouragement, Positive Leasing Aspects, and Workplace Complications	State ownership encourages mixed-use developments and agglomeration.
6	Environmental Considerations	Regulation Planning	The Structural Plan-regulated title deed

The study explores deeply into the complex dynamics of mixed land use planning and development in Addis Ababa, with an emphasis on socioeconomic, physical, and environmental consequences. The impact of state ownership of land, which serves as both a facilitator and a hindrance to the planning process, is one key aspect highlighted. While state ownership simplifies planning, it also encourages informality in open spaces and presents challenges to developers, creating a delicate balance between planning facilitation and execution challenges. The call for a shift to a private landholding system emerges as a potential solution to the constraints imposed by state ownership while also promoting investor rights and flexibility. Lease period differences, particularly for residential properties, have been identified as influential factors shaping the MUD process. Despite the possibility of discouraging residential investment, the transcript suggests that this disparity may encourage long-term business ventures. The mutual benefit of varying lease periods is emphasized, contributing to a harmonious urban landscape in which different functions fill gaps and complement one another.

In Addis Ababa, the intricate relationship between state ownership, lease period disparities, and broader SEPE aspects was highlighted. State ownership appears to be a two-edged sword, facilitating planning while encouraging informality, resulting in a complex landscape for developers. The discussion of lease period disparities reveals a complicated relationship, with long-term residential leases potentially discouraging investment while fostering long-term business viability. Overall, the record underscores the necessity for a nuanced and comprehensive approach to MLUP, balancing positive aspects like vibrant urban environments with challenges such as uncontrolled diversity, emphasizing the importance of clear regulations and Local Development Plans (LDP) for sustainable spatial development in the city.

In the selected study site, observations reveal that land use distribution and concentration vary based on proximity to the city center, impacting pedestrian activity. Interviews with experts' highlight challenges such as misconceptions and regulatory inadequacies, which hinder successful MUD implementation.

This leads to manifestations of mixed land use problems, including functional incompatibility within urban areas.

The findings of this study underscore both the potential and limitations of MLUP in Addis Ababa. While MLUP plays a crucial role in promoting sustainable urban development, aligning with global and regional frameworks like SDG-11 and the African Union's Agenda 2063, its effectiveness is contingent on proper implementation and management. The challenges identified—such as misconceptions about MUD, lack of clear regulations, and issues with state ownership—highlight the complexity of achieving balanced spatial development. Additionally, the varying perspectives of residents, local communities, and key informants reveal the nuanced impacts of MLUP on SEPE dimensions. The study concludes that, while MLUP has the potential to foster inclusive and resilient urban environments, realizing this potential requires addressing the identified challenges, enhancing stakeholder understanding, and enforcing clear and consistent planning regulations to ensure sustainable urban growth in Addis Ababa.

4.5.3 Secondary Data and Document Review on MLUP in Study Area

This section presents the study's findings, organized thematically to address the four research objectives. The analysis integrates secondary data, document reviews, and mixed-methods research. Key results are conveyed concisely, supported by tables and figures to emphasize critical patterns. Sub-sections examine the following themes: 1) Major Effects of MLUP and Development, 2) Impact of MLUP on SEPE in Selected Study Areas, 3) Root Causes of MLUP Challenges, 4) Land-Use Planning Policies and Regulations in Study Areas, and 5) Summary of Secondary Data and Document Review Results.

1. Major Effects of MLUP and Development

The findings show that MLUP and MUD have a substantial influence on the SEPE components of Addis Ababa. The key results include: The MLUP promotes economic growth by combining residential, commercial, and industrial operations, resulting in increased productivity and accessibility. This integration increases work possibilities and decreases travel distances,

especially in densely populated regions. However, the absence of balanced land use, as indicated by the preponderance of residential areas (48% of the built-up area), restricts the full potential of MLUP (AACPPO, 2017a). Physical Effects: MLUP fosters lively urban environments by mixing living, working, and recreational activities. Infrastructure issues, including as the building of the Addis LRT system, have disturbed planned mixed-use regions, resulting in fragmented development and restricted accessibility in major metropolitan zones.(Mekonnen, 2022). Environmental Impacts: MLUP has the ability to minimize urban sprawl and promote sustainable development by shortening travel distances and encouraging effective land use. However, incompatible land uses, such as noise pollution from commercial activity in residential zones, have a detrimental influence on environmental quality and urban livability (AACPPO, 2017a). These findings underscore the dual character of MLUP and MUD, demonstrating their potential to reshape urban environments while also emphasizing the barriers to their effective implementation in Addis Ababa.

Table 4.10 Summary of Major Impacts of MLUP

Aspect	Positive Effects	Negative Effects
Socio-Economic	Job creation, reduced commuting	Infrastructure gaps, political interference
Physical	Vibrant urban spaces, reduced sprawl	Fragmented development, traffic congestion
Environmental	Efficient land use, reduced emissions	Noise pollution, incompatible land uses

Table 4.11 Land Use Composition in Addis Ababa (2002-2012).

Land Use Type	Percentage of Built-Up Area
Residential	48%
Commercial	22%
Industrial	15%

Land Use Type	Percentage of Built-Up Area
Other	15%

Source: AACPPO, 2017a

2. Impact of MLUP on SEPE in Selected Study Areas

The study discovered that MLUP has had varying effects in Addis Ababa's core, transitional, and suburban areas. In core areas, such as the city center, MLUP has contributed to vibrant mixed-use spaces, but it faces challenges such as traffic congestion and incompatible land use. For instance, the Bole International Airport to Meskel Square corridor has witnessed reduced accessibility owing to poorly integrated infrastructural construction (AACPPO, 2017a).

Transitional regions exhibit partial integration of MLUP principles, with some success in mixing residential and commercial roles; nevertheless, political involvement and insufficient enforcement of zoning regulations impede successful implementation. (Mekonnen, 2022). In suburban regions, MLUP is less common, resulting in imbalanced development and a lack of functional cohesion. (AACPPO, 2017b). A qualitative example demonstrates the effect of disruption created by the Addis Light Rail Transit (LRT) structure, which fractured intended mixed-use communities in core zones and restricted social connections (AACPPO, 2017a). A resident in the Bole corridor rebounded this sentiment, stating, "The new highway has made it difficult to walk to nearby shops, which were once easily accessible. The area feels disconnected now."

3. Root Causes of MLUP Dilemmas

MLUP implementation issues in Addis Ababa include legislative and regulatory deficiencies, such as uneven enforcement of land use ordinances and zoning laws, as seen by the unlawful development of hotels in residential zones. (AACPPO, 2017a). Infrastructure constraints, especially inadequate coordination between infrastructure development and land use planning, have

further hampered MLUP, as evidenced in the interruptions created by the Addis LRT project.

Political influence has also played an important role, with development choices frequently being motivated by political concerns rather than solid urban planning principles. Furthermore, the absence of complete integration of MLUP concepts into urban planning has resulted in fragmented and imbalanced growth. The study's surprise result is that the strict 50/50 density percentage for mixed-use construction may not be flexible enough to satisfy local demands, especially in dynamic places like the AGJ Junction. Furthermore, despite the theoretical benefits of MLUP, a lack of coordination between developers and regulatory agencies has worsened implementation issues, particularly in densely populated regions.

Table 4.12 Density standards in mixed residence land use

Mixed Residence Type	Minimum Gross Density (hu/ha)	Residence Share of Total Building Area	Location
High Density	150	30-40%	Centers, corridors, commercial areas
Medium Density	100	60%	Inner ring road areas
Low Density	50	60%	Outside inner ring road

Source: AACPPO, 2017a

4. Land use planning policies and Regulations in study areas

Property rights are vital to economic prosperity and social equality, and they include three key elements: the rights to delegate, use, and trade. When any of these rights are constrained, private property rights are essentially reduced. In Ethiopia, for example, the FDRE Constitution states that all urban and rural land is the property of the state and the Ethiopian people, as detailed in Article

40(3) of the Urban Lands Lease Holding Proclamation (ULLHP), No. 721/2011 (Mengie, 2016). This regulation restricts the sale, exchange, and mortgage of land, which has serious ramifications for urban growth and individual tenure security. State ownership of land inevitably promotes tenure uncertainty, deterring long-term investments and decreasing land production. This absence of solid property rights exacerbates inequality by denying individuals equitable chances and essential human rights (Rahmato, 2004).

The development of property on a given plot frequently improves land quality, resulting in higher land value. This appreciation favors landowners by raising transaction costs, improving access to property markets, and increasing financing availability. Additionally, it increases tax revenues and state profits (Rahmato, 2004). However, Ethiopia's legal system complicates property ownership by defining it as moveable or immovable, as described in Article 1126 of the Civil Code. (Saleh, 2004). Immovable property, like as land and structures, is considered as separate entities, with land ownership held by the state and the Ethiopian people, and building ownership held by individuals. This split ownership system inhibits landowners and developers from erecting permanent structures since they lack complete authority over the property. (Honoré & Guest, 1961).

To address difficulties in the urban land market, the FDRE Parliament passed ULLHP No. 721/2011 in October 2011. This decree attempted to limit the power of property speculators and urban brokers, who were frequently blamed for the spread of slums and social unrest. The former lease transaction system was heavily criticized for its lack of openness, corruption, and inefficiency, especially in municipal land delivery operations. Articles 4 (2) and (3) of the proclamation emphasized these difficulties, while Article 4(4) attempted to foster a more transparent and efficient land transfer system (Mekonnen, 2022). Despite these improvements, issues remain with regard to fair and sustainable urban growth.

The declaration specified five modes of urban land acquisition: auction, negotiation, assignment, award, and lot. Auctions and negotiations were the

principal means used to generate municipal money. However, due to extensive corruption linked with these modalities, the legal framework currently only recognizes tender (auction) and allocation (land lease transfer without bidding) as acceptable lease transfer methods, according to Article 7(2) of ULLHP No. 721/2011. This move reflects the government's efforts to simplify land deals and minimize corruption.

The lease terms for urban land vary greatly based on the planned purpose and amount of urban development. Lease durations vary from 90 years for education, health, culture, and sports to 70 years for industry and 60 years for commerce. These differences hinder mixed-use development projects by influencing management, design, building rules, and access to bank funding. The ambiguity surrounding lease terms raises concerns about profitability and long-term viability, inhibiting investment in these projects. Furthermore, the landowner's authority to decide the mix of uses is frequently influenced by market value rather than the principles of compatibility, integration, and sustainability, as required by Article 21(3) of ULLHP No. 721/2011. This mismatch causes mixed-use projects to routinely depart from authorized land use plans.

The Scarcity of urban land fuels competition, raising lease rates and forcing developers to pursue cost-effective, selected, and lucrative developments. While MUD is a potential answer to urban land constraints, its intrinsic complexity necessitates strong legal and regulatory frameworks to assure success. Unfortunately, the limited and frequently uneven choices for transferring urban land leases impede the smooth execution of MUD projects, creating substantial hurdles for developers and urban planners. Addressing these concerns is crucial to promoting sustainable urban expansion and guaranteeing fair property rights in Ethiopia.

5. Summary of Secondary Data and Document Review Results

The study's findings, structured around four research topics, give crucial insights about MLUP in Addis Ababa. The findings show that MLUP has large SEPE impacts, but its potential is limited by uneven land use and

infrastructural difficulties, such as residential dominance (48% of built-up space) and interruptions created by projects like the Addis LRT. The impact of MLUP differs across core, transitional, and suburban locations. Core areas have the biggest obstacles, including transportation congestion and incompatible land uses, while suburban areas suffer from limited integration and imbalanced growth. (AACPPO, 2017b). Policy gaps, infrastructural restrictions, political meddling, inadequate regulatory enforcement, and a lack of thorough integration of MLUP concepts into urban design are all contributing factors to MLUP issues.

4.6 Root cases behind the impact of MLUP dilemmas on SEPE development.

Finally, in order to comprehend the factors driving the effects of the MUD problem on SEPE facets. The research findings have illuminated significant insights across six overarching themes: Physical Integration and Efficiency, Social Inclusivity and Cohesion, Economic Vibrancy and Sustainability, Environmental Resilience, Policy and Regulation Dynamics, and Development Transformation. Each of these themes plays a distinct role in the complex study urban area of SEPE development. The analysis offers a comprehensive understanding of how these themes interact and influence one another, shaping the evolution of MUD in urban spaces across different zones

4.6.1 Physical Integration and Efficiency

Table 4.13 Physical Integration and Efficiency

Themes	Codes	Excerpts from Transcript
Physical Integration and Efficiency	Urban Design	Emphasis on urban vibrancy and active spaces, reducing extensive travel for services.
	Infrastructure Sharing	Sharing of infrastructure and utilities, fostering

	diversity while maintaining harmony.
Vibrant Spaces	Creating an active and dynamic environment round-the clock, promoting urban vibrancy.
Compact City	Introducing the concept of a compact city for effective urban growth management.

Physical Integration and Efficiency (PIE) involves integrating elements via Infrastructure Sharing, creating Compact City spaces, promoting accessibility, and efficiency. This concept optimizes urban systems, enhances connectivity, and minimizes congestion, fostering harmonious coexistence and functional cityscapes.

4.6.2 Social Inclusivity and Cohesion

Table 4.14 Social Inclusivity and Cohesion

Themes	Codes	Excerpts from Transcript
Social Inclusivity and Cohesion	Travel Reduction	Minimizing the need for extensive commuting, reducing transportation expenses.
	Mutual Support	Traditional mutual support systems in the community, promoting inclusive development.
	Inclusive Development	Addressing social inequalities among diverse urban populations, fostering inclusivity.
	Community Living	Promotion of social cohesion and community living in mixed-use neighborhoods.

Social Cohesion	Emphasis on promoting social cohesion and a sense of community through planning.
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The themes of social inclusivity and cohesion (SIC) emphasize minimizing commuting to reduce transportation costs, promoting traditional mutual support systems, and addressing social inequalities for inclusive development. Encouraging community living in mixed-use neighborhoods and focusing on planning to foster social cohesion and a sense of community are also key aspects.

4.6.3 Economic Vibrancy and Sustainability

Table 4.15 Economic Vibrancy and Sustainability

Themes	Codes	Excerpts from Transcript
Economic and Vibrancy	Stakeholder	Roles of stakeholders such as landlords, clerks, and craftsmen in MUD.
	Roles	
Sustainability	Cross subsidization	Necessity for cross-subsidization and collaboration among diverse economic activities.
	Economically Active Areas	Creating economically active neighborhoods with essential services and businesses.
	Municipal Revenue	Maximizing municipal revenue through economic activities like rent and taxes.
	Urban Economy	Enhancing the urban economy and market dynamics through MLUP.

The themes of economic vibrancy and sustainability (EVS) emphasize the crucial roles of stakeholders in mixed-use developments, the necessity of cross-subsidization and collaboration among diverse economic activities, and the creation of economically active neighborhoods with essential services.

Maximizing municipal revenue through rent and taxes and enhancing the urban economy and market dynamics are also key focuses of mixed land use planning.

4.6.4 Environmental Resilience

Table 4.16 Environmental Resilience

Themes	Codes	Excerpts from Transcript
Environmental Resilience	Land Values	Considering land values in planning and development to enhance economic opportunities.
	Land Suitability	Evaluating land suitability and mitigating hazards like floods in MLUP
	Environmentally Friendly Facilities	Promoting environmentally friendly facilities within mixed-use neighborhoods.
	Carbon Emissions	Reducing carbon emissions from excessive vehicular movement through efficient land use.
	Sustainable Practices	Prioritizing sustainable development practices in mixed land use planning and design.

Environmental Resilience involves designing urban spaces to endure challenges, reflecting climate adaptability, carbon reduction, and hazard readiness. Prominent in cities managing disasters and resources, it proactively addresses urban vulnerability to environmental risks.

4.6.5 Policy and Regulation Dynamics

Table 4.17 Policy and Regulation Dynamics

Themes	Codes	Excerpts from Transcript
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Policy and Regulation Dynamics	Hazard Mitigation	Mitigating environmental hazards like floods through appropriate land use planning.
	Mixed Land Use Policy	The policy of MUD aims to enhance safety and vibrancy of urban areas.
	Regulation Framework	Comprehensive framework with regulations and guidelines for setback, density, development controls.
	Land Use Classification	Introduction of new classification system for mixed-use development based on densities.
	Implementation Strategies	Utilizing density standards to promote mixed land use planning and development.

Policy and Regulation Dynamics (PRD) shape development, Mixed Land Use Policy fosters coexistence. Strong Regulation Framework, Land Use Classification, and State Ownership Influence balance growth. PRD encompasses legal governance, mixed land use policies, regulations, state impact. It signifies orderly growth, coexistence, well-defined policies, robust regulations, state involvement, significant in guiding urban evolution. Its distinct amalgamation of legal instruments and state influence governs urban development uniquely.

4.6.6 Development Transformation

Table 4.18 Development Transformation

Themes	Codes	Excerpts from Transcript
Development Transformation	State Ownership Influence	State ownership enabling comprehensive planning and impacting MUD.
	Adaptability	Need for adaptability to various

	planning Scenarios in MLUP.
Strategic Urban Approach	Desire for a more strategic approach to urban development, aligning with planning trends.
Social Equality	Addressing social inequalities among diverse urban populations through MLUP.
Flexible Legal Framework	Shifting from rigid zoning to a more flexible legal framework in MLUP.
Organized Settlements	Transforming unplanned settlements into organized ones through MLUP..

Development Transformation (DT) evolves urban spaces with adaptability, planning, and social equity. Flexible legal frameworks, organized settlements, and social equality are key. DT prioritizes positive change, responsive urban evolution, and community well-being, emphasizing sustainability and equitable progress.

The study's findings reveal the complex interplay of factors driving the impacts of MUD on socio-economic, physical, and environmental dimensions in urban areas. Through the analysis of six key themes—Physical Integration and Efficiency, Social Inclusivity and Cohesion, Economic Vibrancy and Sustainability, Environmental Resilience, Policy and Regulation Dynamics, and Development Transformation—the research provides a comprehensive understanding of how these elements shape urban spaces. However, limitations arise due to the multifaceted nature of MUD, where challenges like misconceptions, regulatory gaps, and state ownership influence can hinder effective implementation. Despite these challenges, the study concludes that with strategic planning and the adoption of adaptable policies, MUD can significantly contribute to sustainable urban development, fostering vibrant, inclusive, and resilient communities.

CHAPTER FIVE: DISCUSSION

5.1 Introduction : Reconciling MLUP Policy and Practice

This research investigates how Mixed Land Use Planning (MLUP) shapes spatial development in Addis Ababa's dynamic urban landscape, specifically analyzing land use distribution patterns in four strategic areas (MCC, MC, SC, AGJ) and evaluating MLUP's multidimensional impacts on socioeconomic, environmental, and physical (SEPE) urban systems. The study reveals critical imbalances: residential use dominates (79% in SC) while commercial and mixed-use development lags significantly, demonstrating how location-specific factors override MLUP designs, as confirmed by spatial statistics (χ^2 $p < 0.05$; $r = -0.123$). Urban planners' express divergent views—while socially accepted, MLUP's economic and environmental outcomes remain contested—highlighting implementation gaps between planning theory and practice. These findings frame four key discussion themes: (1) the disconnect between urban function distribution and MLUP regulations, (2) planner consensus on social benefits versus economic-environmental trade-offs, (3) systemic challenges in MLUP's SEPE impacts, and (4) root causes of implementation barriers. The analysis bridges empirical data with urban theory, demonstrating how Addis Ababa's development trajectory demands policy reforms—including location-sensitive zoning, integrated SEPE planning frameworks, and stricter mixed-use enforcement—to transform MLUP from conceptual promise into equitable urban transformation, providing actionable insights for policymakers, practitioners, and Scholars navigating the complexities of African urbanism.

5.2 Discussion Section

5.2.1 Urban Function Distribution Analysis

The functional distribution of urban areas in selected study area in Addis Ababa, and the extent to which location-specific factors influence functional distribution more than MLUP policy. The findings show that urban functions are unevenly distributed, and location plays a more significant role than MLUP policy. Residential functions dominate all the study areas, while commercial and mixed functions are less prevalent, an indication of the lack of balanced urban development. The chi-square test ($\chi^2 = 47.763$, $df = 6$, $p = 0.001$)

supports the presence of a statistically significant relationship between location and functional distribution, giving credence to the hypothesis that location factors are most influential in shaping patterns of urban function. This agrees with visual evidence from Figures 4.1 to 4.5, which show the uneven distribution of functions across the study areas.

The findings are consistent with (Carpio-pinedo et al., 2021) argument that MUD is different in theory and practice (Aerni, 2016). Despite the fact that MLUP policies endorse integrated land use, Addis Ababa's urban form displays fragmented and location-led functional distribution. The identical trends have been identified in other developing cities, where flourishing urbanization and weak regulatory frameworks result in inconsistent land use planning (Grant, 2002a; Yeboah & Kakraba-ampeh, 2016). Contrary to controlled contexts in Europe or North America, where MLUP principles are effectively implemented (Calthorpe, 2013), Addis Ababa's urban development appears to be determined by more random location-specific forces than planning.

One unexpected finding was the weak negative correlation ($r = -0.516$) between location and functional distribution, which implies that functions are scattered in what appears to be a random manner. This was against the a priori hypothesis that location would have a more immediate influence on functional patterns. One reason may be the lack of effective regulatory policies and enforcement mechanisms, allowing ad hoc development. Socio-economic factors, such as informal settlements and unplanned urbanization, might also be accountable for such randomness.

These findings highlight the inadequacy of adhering to theoretical MLUP models without any concern for location-specific parameters. The study underscores that a more sensitive conceptualization of urban planning needs to integrate spatial analysis, socio-economic parameters, and regulatory enforcement. Practically, it would involve designing location-specific zoning rules and strengthening institutional capacities for realizing MLUP principles.

The study's findings suggest these observed trends in urban function distribution likely extend citywide given the diversity of sampled locations, though further research should confirm this generalizability. The results reveal a significant misalignment with Addis Ababa's MLUP goals, highlighting three critical needs: (1) revised zoning policies responsive to location-specific requirements, (2) integrated planning approaches that reconcile socioeconomic realities with MLUP principles, and (3) stricter enforcement of mixed-use regulations to reduce arbitrary development patterns. While location remains a primary determinant of function distribution, these findings demonstrate that Addis Ababa's master plan requires more adaptive implementation strategies to effectively bridge planning theory with urban practice and ensure equitable, sustainable urban growth.

Addis Ababa's urban functions exhibit a seemingly random and uncoordinated distribution, starkly deviating from MLUP principles due to weak regulatory enforcement and institutional gaps (Halimoon et al., 2021b; Yeboah & Kakraba-ampeh, 2016). Unlike structured European and North American cities where MLUP ensures functional integration (Calthorpe, 2013), Addis Ababa's haphazard urban form reflects disjointed planning, arbitrary land-use decisions, and inadequate policy frameworks (AACPPPO, 2017b; ORAAMP, 2002). Planners express skepticism about MUD economic benefits, as unregulated expansion and infrastructural deficits undermine its theoretical potential; (Watson, 2009a). Addressing these challenges requires stringent land-use regulations, incentivized private investment, and robust environmental monitoring to align urban growth with MLUP principles (Lago et al., 2024). Adaptive strategies—such as participatory zoning and enforcement mechanisms—are critical to curbing fragmentation and fostering equitable development in rapidly urbanizing contexts.

5.2.2 Disagreement and Agreement between Urban Planners' Perceptions regarding MLUP and SEPE Development

This study presents a comprehensive analysis of urban planners' views on Mixed Land Use Planning (MLUP) and Mixed-Use Development (MUD) in

Addis Ababa, examining their impacts across social, economic, physical, and environmental dimensions. The findings, collected through Likert-Scale responses, reveal a nuanced picture of urban development challenges and opportunities in the city.

Regarding social development, planners demonstrate strong consensus about MUD's social acceptability, with 40% agreeing and 12.5% strongly agreeing that it aligns well with community norms and values. However, this positive perception is tempered by concerns about equitable benefit distribution, as 35% of respondents believe MUD favors certain groups while only 42.5% see it as cost-effective in delivering social benefits. The economic dimension presents more pronounced skepticism, where 35% of planners disagree that MUD fosters economic vibrancy and 32.5% perceive negative economic impacts, suggesting significant doubts about its contribution to local prosperity.

In the physical development sphere, planners express considerable confidence in MLUP's foundational role, with 70% combined agreement (50% agree, 20% strongly agree) that it effectively structures urban planning instruments. This endorsement is somewhat qualified by concerns about implementation, as 40% acknowledge issues with functional allocation of spaces. Environmental considerations emerge as particularly problematic, with 67.5% of planners identifying negative environmental impacts from MUD and an overwhelming 67.5% highlighting regulatory ambiguities in mixed-use implementation. These environmental concerns are compounded by perceptions of intergenerational inequality in environmental outcomes.

The study reveals an important paradox in Addis Ababa's urban development trajectory. While MUD enjoys broad social acceptance and MLUP is widely recognized as an effective planning framework, both approaches face significant challenges in delivering economic benefits and environmental sustainability. The divergence in planners' perspectives underscores the complex trade-offs involved in urban development, where social gains may come at economic or environmental costs. These findings point to the need for

more nuanced policy approaches that can simultaneously address social inclusion, economic vitality, physical planning efficiency, and environmental protection. The current regulatory environment appears particularly inadequate in addressing environmental concerns, suggesting an urgent need for clearer guidelines and stronger enforcement mechanisms. Ultimately, the study highlights the importance of developing more integrated urban planning strategies that can balance these competing priorities while maintaining public support for development initiatives.

5.2.3 The impact and Challenges of MLUP on SEPE Development

The existence of Mixed Land Use Planning (MLUP) in Addis Ababa embodies complex urban dynamics that reinforce as well as contradict mainstream planning assumptions. The research findings demonstrate significant spatial variations in mobility patterns with MCC residents traveling significantly longer distances (2500m a day) in their movement compared to the other areas (Figure 4.7), contradicting the assumed proximity benefit of mixed-use development (AACPPO, 2017a). This unexpected finding, together with the predominant reliance on taxis (65.6% in MCC) rather than walking or public transport (Figure 4.9), refers to inherent shortcomings of functional integration and pedestrian infrastructural design in current MLUP practices. Land use conflicts are particularly problematic, with 37.2% of MCC residents reporting noise from bars and 29% in SC/AGJ reporting issues with shops and warehouses (Figure 4.10), depicting what (Mohamed et al., 2021) calls "planning dissonance" where physical proximity begets negative externalities rather than synergies. MC's 38.7% incompatibility rate (Figure 4.11) also underscores the pressing need for more sophisticated use-separation approaches under MLUP Schemes.

Economic and social characteristics show a similarly complicated picture, with the development of "quasi-mixed" areas instead of properly integrated spaces. AGJ's specialization as a working destination (receiving 38% of travelers) and SC's specialization in shopping (Figure 4.12) contradict the presumed variety of mixed-use places, and the 93% use of taxis in SC (Figure 4.13) raises doubts about the accessibility gains from MLUP. Pedestrian experiences highlight

significant urban quality concerns, with 67% of SC visitors coming primarily for basic needs rather than entertainment purposes (Figure 4.15), and safety being a primary concern (34% reporting theft concern, 38% citing overcrowding) (Figure 4.16), in accordance with (Tolera & Studies, 2024) explanation of the "safety paradox" of African urban developments. Governance problems appear to be systemic, with state ownership providing planning gains and implementation constraints (Table 4.9), and environmental management lapses, as shown by noise pollution and incompatible uses (Table 4.10), bearing witness to (Mekonnen, 2022) observation of Addis Ababa's "partial integration" problem. The 48% residential dominance in built-up space (Table 4.11) also shows the lopsided land use structure undermining MLUP ideals. Large infrastructure projects like the LRT have had the perverse effect of disjointing mixed-use communities (AACPPO, 2017a), revealing the vulnerability of MLUP outcomes to exogenous interventions and illustrating the imperative of more consolidated planning approaches addressing institutional, regulatory, and design dimensions simultaneously to achieve sustainable urban development goals.

5.2.4 Root Causes of MLUP Dilemmas Impacting SEPE Development

The study explored the root causes of the impact of MLUP puzzles on SEPE growth in urban areas. Analyzing six core themes—Physical Integration and Effectiveness, Social Inclusiveness and Harmony, Economic Dynamism and Sustainability, Environmental Adaptability, Policy and Regulation Dynamics, and Developmental Transformation—the study explored how these forces interact to shape urban space. The study reveals that while MLUP is able to create dynamic, inclusive, and sustainable communities, its efficiency is often marred by myths, legislative loopholes, and state ownership aspects.

The results highlight the double-edged role of MLUP in urban planning. While on the one side it promotes physical integration and efficiency through the creation of compact, dynamic cities with reduced travel distances and enhanced accessibility, Social cohesion and inclusivity are fostered by community living and mutual support systems, while economic vitality is built by maximizing municipal income and creating economically thriving neighborhoods.

Environmental resiliency is achieved through sustainability and risk reduction. Challenges, however, are strict zoning regulations, poor regulatory systems, and state ownership patterns that have a tendency to hinder effective implementation of MLUP, thus leading to fragmented and inefficient urban development.

The findings are consistent with the findings of previous studies such as (Negi, A. S., & Mann, 2024; Ustaoglu & Williams, 2024), which note the socio-economic and environmental benefits of MLUP, such as reduced commuting costs, enhanced social cohesion, and sustainable urban development. The challenges that were discovered in this study, particularly the ones concerning regulatory gaps and state ownership, contrast with the findings in highly regulated settings such as Europe and North America where MLUP is typically associated with well-planned urbanization and urban development (Calthorpe, 2013; Wendt, 2009).

Among the unexpected findings was the low impact of MLUP on environmental resilience in some areas, despite the theoretical potential of reducing carbon emissions and promoting sustainable land use. The reason for this is the lack of policies that can be enforced and collaboration among stakeholders, which has the tendency to create incompatible land use and environmental degradation.

These results emphasize the need for adaptive regulatory frameworks and how they align the benefits of MLUP with the challenges of implementation. In practice, this may involve modifying density regulations, enhanced stakeholder coordination, and the integration of SEPE considerations into city planning mechanisms.

5.3 Implications

The research results open up critical gaps and windows of opportunity in Addis Ababa's Mixed Land Use Planning system, with far-reaching policy, practice, and research implications. It exposes systemic mismatches between ideal

planning norms and their implementation, necessitating prompt reforms guaranteeing urban development meets socio-economic equity, environmental sustainability, and functional integration standards. We outline the major implications on five analytical frameworks below.

5.3.1 Policy and Regulatory Reforms: From Rigidity to Adaptive Planning

The study reveals that Addis Ababa's existing MLUP system is tainted by over-regulatory rigidity, creating a broad disparity between policy blueprints and local spatial realities. Robust statistical evidence ($\chi^2 = 47.763$, $p = 0.001$) demonstrates how location-specific conditions routinely override cookie-cutter zoning regulations to yield fragmented and ineffective land use patterns across the city (Figures 4.2–4.5). This inherent gap between urban theory and planning practice demands three key reforms. Firstly, the establishment of context-sensitive zoning regulations must replace current one-size-fits-all density regulations (Table 4.12) with differentiated agendas for high-intensity commercial corridors like AGJ Junction versus low-density residential neighborhoods. Second, decision-making must be decentralized to alleviate the conflict in Ethiopia's state-controlled land ownership system (ULLHP No. 721/2011), which while providing strategic planning advantages, simultaneously restricts local flexibility and paradoxically stokes informal development (Rahmato, 2004). Third, bureaucratic hold-ups in project approvals must be streamlined to allow sorely needed private sector investment in mixed-use developments. Without such comprehensive reforms to introduce greater flexibility and responsiveness into the planning system, MLUP risks being an aspirational document rather than an operational tool for shaping Addis Ababa's urban development.

5.3.2 Socio-Economic and Physical Integration: Bridging the Equity Gap

The study reveals a paradoxical reality in Addis Ababa's MLUP practice, where relatively good social acceptability (40% public agreement, Table 4.5) contrasts with undesirable economic and physical outcomes. Three major problems emerge from the findings. First, the presumed economic vibrancy of planned mixed-use districts is yet to materialize, as signaled by high

stakeholder dissatisfaction (35%, Table 4.6), suggesting that current incentive structures do not adequately stimulate compatible commercial growth. This necessitates policy reactions such as selective tax benefits for companies capable of demonstrating that they serve MLUP objectives. Second, integration of infrastructure displays severe deficiencies, most Obvious the Addis LRT system's spatial misalignment with adjacent land uses (AACPPO, 2017b), emphasizing the need to absorb TOD principles in future projects. Third, pronounced spatial imbalances persist, with peripheral areas exhibiting overwhelming residential predominance (48%, Table 4.11) and core districts challenged by extreme congestion (32% of commuters facing 15-30 minute delays, Figure 4.14). Such imbalances call for strategically attuned response through concurrent densification in suburbs and diversification in urban cores. Finally, the full potential of MLUP can be realized only by addressing simultaneously two important dimensions: enhancing the economic justification of mixed-use development and physical infrastructure development in synchronization with the pattern of urban growth.

5.3.3 Environmental Governance: Mitigating Degradation Through Policy.

Findings dictate environmental sustainability to be the most significant problem facing MLUP implementation in Addis Ababa, where a total of nearly half of the respondents (47.5%) suggested serious negative ecological impacts (Table 4.8). This is a concerning state of affairs, largely because the current system of regulation fails to fold in enforceable environmental safeguards, and this has spawned three interlinked problems: one, the diffusion of cacophonous uses generating unnecessary noise and air pollution, particularly from entertainment outlets alongside homes (Figure 4.10); two, open space reduction through uncontrolled densification in an irreplaceable manner; and three, the intensification of urban heat islanding conditions in high-density commercial strips like MCC. To address these pressing issues, the municipal governments should implement a three-branch policy: (1) mandatory environmental impact assessment of all mixed-use developments to evaluate and counteract the impacts on the environment; (2) mandatory use of green building codes and the requirement for urban greenways in highly urbanized areas; and (3) regularization of ambiguous environmental legislation, which 32.5% of the

stakeholders cited as an important hindrance to realization (Table 4.8). These efforts would not just rectify current environmental shortcomings but also place Addis Ababa's urbanization trajectory on a path that is consistent with SDG 11 and international best practices of climate-resilient urbanization.

5.3.4 Institutional Reforms: Strengthening Governance and Enforcement

The analysis pinpoints high systemic loopholes in the implementation of policies (Cohen's $d = 0.353$), indicating fundamental institutional weaknesses in monitoring capacity and inter-agency coordination. The implementation gaps show up in three critical dimensions requiring urgent institutional transformation. To begin with, the procurement of digital spatial monitoring systems would facilitate real-time tracking of development compliance, acting as a critical instrument in monitoring unplanned urban sprawl. Second, establishing specialized inter-agency task forces may fill current gaps to enable planned coordination of infrastructure networks (transportation corridors and utility systems) and land-use objectives. Third, institutionalized processes of community engagement need to be adopted to address acute livability challenges in cities, particularly pedestrians' safety issues facing 34% of the respondents (Figure 4.16). These institutional reforms cumulatively correct implementation failure's underlying defects, offering the institutional support necessary to convert progressive urban policy into material outcomes. The outcomes reinforce the point that without these more inclusive-based reorganization of governance systems, even theoretically justified planning interventions will still fail in practice, filling the gap between intention and urban reality.

5.3.5. Future Research Directions

The findings of the research establish several critical knowledge gaps that require academic research to enhance theoretical understanding and applicability of MLUP in Addis Ababa. Three extremely crucial research streams are established through this research. First, systematic comparative urban analysis may yield valuable lessons by comparing Addis Ababa's MLUP framework with world-acclaimed success stories, like Berlin's trail-blazing

Kreuzberg district regeneration (Chakrabarti, 1988) or Singapore's paradigm transit-oriented development (TOD) concept. Second (Afonso & Paiva, 2017), longitudinal research approaches must be employed to track and evaluate the evolving socio-economic impacts of MLUP implementation over time, yielding valuable data on its long-term performance and unexpected side effects. Third, and critically, future research will have to utilize interdisciplinary approaches combining anthropological understandings of cultural norms and economic analysis of informal sector dynamics into urban planning models. Such research agendas would not only fill current academic gaps but guide policymakers with evidence-based advice to rationalize MLUP plans in a manner responsive to local context while achieving sustainable urban development goals. Evolution of these areas of knowledge can potentially contribute significantly to the theoretical foundation and practical application of mixed-use urban planning in Ethiopia's rapidly evolving capital city.

The findings of this research collectively suggest a drastic paradigm shift in Addis Ababa's urban planning approach—a shift from rigid, top-down prescriptions to an adaptive, context-oriented approach. The evidence highlights the necessity for policy principles to be tied to ground realities by prioritizing three fundamental principles: adaptive governance to respond to local spatial processes, equitable development to address socio-economic inequalities, and ecological resilience to address environmental degradation. Applying these reforms—through evidence-based changes to zoning, institutionalized community participation, and enforceable sustainability standards—would elevate MLUP from its current fragmented application to a logical strategy for inclusive urban change. This change would not only address Addis Ababa's immediate challenges but also align the city's development trajectory with global sustainability targets, including the NUA and Africa's Agenda 2063. Ultimately, this holistic approach offers a way to reconcile urban growth with livability, making Addis Ababa's future densely populated yet socially just, economically vibrant, and environmentally sustainable.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Urban growth in rapidly developing cities like Addis Ababa is marked by an intrinsic contradiction between formal regulatory frameworks, such as MLUP, and the organic, location-driven processes of urban development. Although MLUP seeks to promote walkability, economic vibrancy, and environmental sustainability, its implementation does not necessarily lead to these conditions because of institutional inefficiencies, policy contradictions, and socio-spatial disparities. This study critically examines the performance of MLUP in Addis Ababa by exploring four dimensions. First, it examines urban function allocation to determine whether the official designation of residential, commercial, and mixed-use zones is less driven by location-specific factors than by formal plans. Second, it explores planners' attitudes to determine how city practitioners perceive the social, economic, physical, and environmental (SEPE) impacts of MLUP. Third, it diagnoses mismatches between the theoretical benefits of MLUP and the evident inefficiencies in transport, land use, and environmental management. Finally, it investigates the root causes of MLUP's shortcomings, including rigid zoning controls, leasehold constraints, and political interference. By combining spatial analysis, stakeholder questionnaires, and policy analysis, this research transcends conventional MLUP models and provides context-sensitive recommendations to foster inclusive urban development in Addis Ababa and other similar cities in the Global South.

6.1.1 Urban Function Allocation Evaluation:

This research analyzed the urban functional distribution in Addis Ababa, with emphasis on the role of location-specific factors compared to MLUP regulations. The results indicate that location-specific factors play a strong role in determining urban functional distribution, surpassing the role of MLUP systems. Residential, commercial, and mixed-use functions are not evenly distributed, and location is a key determinant. Statistical testing ($\chi^2 = 47.763$, $df = 6$, $p = 0.001$) confirms significant association between location and functional distribution to demonstrate the limitations of MLUP in achieving balanced urban growth. The findings underlie the necessity of measures at the

local level that respect local realities and promote flexible regulatory tools and involvement of stakeholders for sustainable urban development.

Implementation problems of MLUP like uneven functional distribution and regulatory loopholes have also been indicated in the research. While MLUP aims to build up cities into cosmopolitan spaces, its potential is often thwarted by environmental constraints and infrastructural constraint. Such findings add to general discourse in the urban planning field by fostering holistically integrated solutions that equilibrate spatial, regulatory, and socio-economic determinants. In future research, socio-economic factors, such as income inequality and informal settlements, must be explored in further detail to determine their impact in urban functional distribution. Longitudinal and comparative studies, coupled with the application of novel technologies like GIS and machine learning, can enhance the precision and utility of urban planning strategies.

6.1.2 Urban Planners' Views:

Addis Ababa planners reveal critical contradictions in MUD implementation, high social acceptance (combined agreement 52.5%) but strong economic skepticism (35% disagree that it constructs dynamic economies) and environmental concerns (67.5% experience adverse impacts). While 70% favor MLUP's physical planning role, 40% confess improper land-use distribution, reflecting "planning dissonance" when formal systems fail to ensure functional synergy. These findings conflict with Jacobs' (1961) diversity model and identify "quasi-mixed" zones of physical co-residence but low-level integration. The interventions to meet Addis Ababa's sustainable urbanization are proposed by the research: (1) location-tied economic incentives, (2) hybrid government incorporating state rules and local knowledge's, (3) riAGJus environmental conditions, and (4) Pedestrian-Scale designs in high-density areas. Future research must employ longitudinal methods to assess these interventions beyond the current study's perceptual data limitation. Lastly, in order to be effective, MLUP should reconcile orderly planning with opportune urban tendencies to provide equivalent SEPE outcomes in Addis Ababa's particular context.

6.1.3 MLUP Challenges, and Impact on SEPE Development

This study uncovers implicit contradictions in Addis Ababa's MLUP implementation, where vibrant mixed-use places are ringed by persistent issues: commuters' over-traveling (2000-2500m per day, 65.6% taxi dependency), economic underperformance (37.2% incompatibility reporting between land uses), and environmental degradation (67.5% of planners reporting regulation deficits). These findings validate "planning dissonance" (Mengistu, 2020) - physical mixing without functional synergy - while falsifying Jacobs' (1961) diversity model through observed "quasi-mixed" spaces. The study develops a Global South MLUP approach acknowledging ways informal tendencies (e.g., SC's 41/ha organic density) subvert formal Schemes, especially challenging Transit-Oriented Development expectations following LRT-fostered community fragmentation. Four revolutionary solutions arise: (1) adaptive density norms (>40/ha in SC compared to <20/ha in AGJ), (2) hybrid government combining state regulation with community compacts, (3) pedestrian-oriented high-density areas, and (4) GIS-facilitated land use surveillance. While limited by cross-sectional design, the study redefines urban success as augmenting - not limiting - organic spatial rationality, invoking MLUP's shift from repressive regulation to responsive framework that harmonizes with Addis Ababa's natural urban cadences to facilitate equitable, sustainable urbanization. Future research should track LRT impacts, provide African city comparisons, and include climate resilience metrics.

6.1.4 Root Causes of MLUP Issues Impacting SEPE Development

This study untangles the systemic constraints weakening MLUP's transformational potential in Addis Ababa, and reveals a paradox of "regulatory duality" where state regulation (ULLHP No. 721/2011) enables planning but restricts flexibility by rigid density requirements (50/50 rule) and constitutional land ownership (Article 40(3)). While MLUP generates vibrant spaces (Table 4.13), contradictions facing critique are critical: Addis LRT disrupts communities, 38% pedestrian congestion still remains (Figure 4.16), and 67.5% of planners report environmental degradation (Table 4.8) despite

emission-reduction targets. This research contributes to urban theory in three respects: (1) revealing how leasehold terms (60-90 years) create specialized development timescales that are immune to Eurocentric approaches; (2) demonstrating "quasi-integration" within SC's organic 41/ha aggregates versus AGJ's 19/ha zones; and (3) describing an "adaptive density" approach attuned to observed site capacities. Four policy suggestions emerge: (1) dynamic zoning in place of static ratios, (2) community land trusts bridging state-developer divides, (3) carbon/noise budgets with teeth, and (4) AI-monitored land use. Although limited by its cross-sectional design, the research recasts MLUP success in terms of strategic congruence with Addis Ababa's urban metabolism, suggesting a shift from regulatory control to adaptive co-governance in which MLUP serves as an intermediary of density, diversity, and equity in Africa's urban transformation. Follow-up studies should track LRT impacts in the long term and compare to Kigali's hybrid ownership arrangements to strengthen this model.

This study reveals an intrinsic dissonance in Addis Ababa's MLUP plan, wherein institutional lacunae and strict regulations contradict location-specific urban growth. The most pertinent results confirm that local processes—rather than policy—and not land use ($\chi^2 = 47.763$, $*p* = 0.001$), are determined by local processes, while planners confirm social utility of MLUP (52.5% approval) but indicate economic and environmental shortfalls (67.5% indicate harm). Recurring issues like taxi dependency (65.6%) and land-use dispute (37.2%) show systemic failings, driven by autarchic leasehold law and politicking, that create "quasi-mixed zones." The study promotes adaptive zoning, mixed governance, and foot-orientated reform as the way to bring policy into harmony with organic urbanism. Long-term infrastructure impacts and AI-enabled planning are topics that should be explored in future studies. Ultimately, MLUP must shift from rigid control to a flexible, fair system that supports Addis Ababa's expansion and progress without compromising sustainability and inclusivity.

6.2 Recommendations

The study's findings reveal gigantic loopholes in the implementation of Addis Ababa's MLUP framework, particularly in maintaining balanced SEPE outcomes. Based on empirical information from our analysis, we provide an integrated array of interventions to address four significant areas of concern with particular actions assigned to respective stakeholders.

6.2.1 Optimizing Land Use Distribution

The spatial analysis on the study revealed inefficient patterns of distribution where commercial development was disproportionately placed in certain locations (MCC and AGJ accounting for 38.7% of daily travel) to the detriment of residential zones being under-served. To remedy this, city planners should embrace the GIS-based spatial analysis methods highlighted in Figures 4.2 - 4.5 to strategically locate mixed-use developments in lieu of the current random allocation method. Notably, particularly, is the need to revisit rigid 50/50 density demands that have proven futile in high-demand areas like AGJ Junction. Developers can also contribute through accepting context-sensitive approaches that allow for Neighborhood-scale commercial space in residential zones, learning from triumphing instances in SC where 67% of pedestrian use centers on local commerce. Community planning committees must be established by community organizations to provide grass-roots input on local land use needs, to complement the 40% social acceptability of MUD reflected in Table 4.5.

6.2.2 Strengthening Regulatory Systems

Analysis demonstrated significant defects in the regulatory system, with a 5% commercial and 48% residential mismatch reflected in Table 4.10, and 47.5% of residents disrupted by noise pollution from incompatible land use in Figure 4.11. The municipal government would establish an independent Urban Planning Commission with strong enforcement authority to address the policy requirements listed in Tables 4.13-4.18. The AACPPO would lay down specific mixed-use standards and enforcement procedures, with particular emphasis on mitigating the environmental effects. Academic institutions can

facilitate such efforts by implementing annual policy impact assessment and planners' special training programs, based on the regulatory analysis in section 4.5.3.

6.2.3 Addressing Systemic Barriers

Ownership limits and infrastructure shortfalls continue to limit sustainable development, as indicated by the disruption caused by the LRT project (AACPPPO, 2017b). Pilot innovative hybrid land ownership solutions must be conceptualized by the federal government to rectify the state ownership problems identified in Table 4.9. The Transport Authority must ensure greater coordination among MLUP objectives and infrastructure projects to prevent accessibility deficits along the Bole-Meskel corridor from recurring. Global collaboration can support these interventions through funding smart city pilots that implement IA solutions for real-time land use management.

6.2.4 Implementation Pathway

For the ease and sustainability of implementing the Master Land Use Plan (MLUP), a phased implementation is recommended with clear short-, medium-, and long-term goals. Short term (0-2 years) would be dedicated to laying down emphasis on the establishment of an autonomous Urban Planning Commission and initiating major zoning reforms to create the institutional setup. Medium term (2-5 years) would be spent in city-wide roll-out of participatory planning instruments by means of people's participation, stakeholders' consultation, and capacity building. Lastly, the 5-10 year objectives will focus on the complete integration of MLUP with infrastructure development by coordinating urban growth, transportation infrastructure, and public services in accordance with sustainable land use principles. This systematic, phased process allows for orderly advancements while ensuring flexibility for adaptive management through ongoing monitoring and evaluation, ultimately achieving balanced, resilient urban development that maximizes MLUP's socio-economic and environmental benefits for Addis Ababa.

These evidence-based recommendations provide a combined tool kit for capacity development in MLUP to be an effective tool of sustainable urban development in Addis Ababa. By addressing the spatial mismatches identified in Figures 4.2 - 4.5 and the stakeholder issues summarized in Tables 4.5 - 4.8 through focused, stakeholder-specific interventions, the city can overcome the institutional and technical challenges documented in this report. The successful implementation will require firm commitment from all parties, but the prospect of more efficient utilization of land, improved standard of living, and increased environmental sustainability makes it a mission of utmost importance for the future development of Addis Ababa.

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LIST OF APPENDICES

Appendix 1. Published and submitted articles

A) Published Articles

1. Jinollo, G. T., Workalemahu, L., & Adugna, D. (2024). Spatial distribution of Urban land-use in Addis Ababa, Ethiopia. *Urban, Planning and Transport Research*, 12(1), 2307364
2. Jinoll, G. T., Workalemahu, L., & Adugna, D. (2024). Impact assessment of mixed land-use planning in Ethiopia: The case of Addis Ababa. *Heliyon*, 10(24).
3. Jinollo, G. T., Habtemariam, L. W., & Belete, D. A. (2025). The impacts of mixed land use planning on spatial development. *DiHayhuletover Cities*, 2(1), 1-16.

B) For Possible Publications

4. Explore the root cases behind the impact of MLUP dilemmas on SEPE development.

Appendix 2 Statistical Test

Table 1 MCC residences travel distance, rate of travel, mode of transport, time spent to reach different type of uses

Area	Group	Descriptive Statistics				Rank	Test Statistics				Inference
		Variables	N	M	SD	Friedman Mean Rank	Chi-Square	df	Asymp. Sig.	W	
MC C	Residences	Travel distance	78	4.03	1.423	2.20	121.6Sc	2.000	0.000	0.780	Significant
		Rate of travel	78	1.77	.772	1.09					Significant
		Modes of transportation used	78	5.24	.724	2.71					Significant

		Time spent reaching from home to Work place, office.	78	3.68	1.694	4.96						Significant
		Time spent reaching from home to Commerce (Traditional or Supper market, Shop)	78	3.73	2.118	4.96	105.195	7.000	0.000	0.193		Significant
		Time spent (min) do you spent reaching	78	3.49	2.137	4.30						Significant

		from home to Public Services (Bank, clinic, Pharmacy, Workshop,)									
		How long (min) do you spent reaching from home to School	78	3.58	1.732	4.79					Significant
		How long (min) do you spent reaching from home to religious	78	4.24	1.745	5.55					Significant

		places									
		How long (min) do you spend reaching from home to Administration	78	4.36	1.974	5.35					Significant
		How long (min) do you spend reaching from home to Leisure Activities	78	2.99	1.632	3.54					Significant
		How long (min) do you spend	78	2.18	1.510	2.54					Significant

		reaching from home to Station									
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Source: Calculated Based on the Field Survey. 2020

Table 2 MC residences travel distance, rate of travel, mode of transport, time spent to reach different type of uses

Area	Group	Descriptive Statistics			Rank	Test Statistics				Inference	
		Variables	N	M	SD	Friedman Mean Rank	Chi- Square	df	Asymp. Sig.		Kendall's (W)
MC	Residence	How far do you travel in km?	81	4.37	2.058	2.37	46.167	2	0.000	0.285	Significant
		How often do you travel?	81	2.38	1.365	1.41					Significant
		What means of transportation do you	81	3.72	1.957	2.Sc					Significant

		use?									
		How long (min) do you spend reaching from home to Work place, office.	81	3.81	1.872	4.81					Significant
		How long (min) do you spend reaching from home to Commerce (Traditional or Super market,	81	2.69	1.045	2.91	114.87	7	0.000	0.202	Significant

		Shop)									
		How long (min) do you spent reaching from home to Public Services (Bank, clinic, Pharmacy, Workshop,)	81	3.10	1.125	3.76					Significant
		How long (min) do you spent reaching from home	81	3.15	1.314	3.81					Significant

		to School									
		How long (min) do you spent reaching from home to religious places	81	4.28	1.Sc7	5.62					Significant
		How long (min) do you spent reaching from home to Administration	81	4.64	1.683	6.10					Significant
		How long (min) do you spent	81	3.52	1.590	4.38					Significant

		reaching from home to Leisure Activities									
		How long (min) do you spent reaching from home to Station	81	4.15	2.367	4.61					Significant

Source: Calculated Based on the Field Survey. 2020

Table 3 SC residences travel distance, rate of travel, mode of transport, time spent to reach different type of uses

Area	Group	Descriptive Statistics				Rank Friedman Mean Rank	Test Statistics				Inference
		Variables	N	M	SD		Chi-Square	df	Asymp. Sig.	Kendall's (W)	

SC	Residence	How far do you travel in km?	124	4.90	.887	2.46	183.759	2	0.000	0.741	Significant
		How often do you travel?	124	1.96	1.015	1.10					Significant
		What means of transportation do you use?	124	4.78	1.048	2.44					Significant
		How long (min) do you spent reaching from home to Work place,	124	5.13	2.566	5.46	100.635	7	0.000	Significant	Significant

		office.									
		How long (min) do you spent reaching from home to Commerce (Traditional or Supper market, Shop)	124	3.89	1.968	4.21					Significant
		How long (min) do you spent reaching from home	124	3.42	1.702	3.61					

		to Public Services (Bank, clinic, Pharmacy, Workshop,)										
		How long (min) do you spent reaching from home to School	124	4.36	2.143	4.56						Significant
		How long (min) do you spent reaching from home to	124	3.9	1.579	4.42						Significant

		religious places									
		How long (min) do you spend reaching from home to Administration	124	4.73	2.195	5.29					Significant
		How long (min) do you spend reaching from home to Leisure Activities	124	4.85	2.517	5.17					Significant
		How long (min) do	124	3.33	1.983	3.28					Significant

		you spent reaching from home to Station									
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Source: Calculated Based on the Field Survey. 2020

Table 4 AGJ residences travel distance, rate of travel, mode of transport, time spent to reach different type of uses

Area	Group	Descriptive Statistics				Rank	Test Statistics				Inference
		Variables	N	M	SD	Frideman Mean Rank	Chi-Square	Df	Asymp. Sig.	Kenda Il's (W)	
AGJ	residence	How far do you travel in km?	93	3.97	1.246	2.12	127.239	2	0.000	0.684	Significant
		How often do you travel?	93	1.52	1.017	1.16					Significant

		What means of transportation do you use?	93	4.88	1.160	2.72					Significant
		How long (min) do you spent reaching from home to Work place, office.	93	3.06	2.330	4.09					Significant
		How long (min) do you spent reaching from home to Commerce (Traditional or Supper market, Shop)	93	2.94	1.258	4.37	256.162	7	0.000	0.393	Significant
		How long (min) do you	93	2.42	.785	3.41					Significant

		spent reaching from home to Public Services (Bank, clinic, Pharmacy, Workshop,)								
		How long (min) do you spent reaching from home to School	93	3.44	1.005	5.31				Significant
		How long (min) do you spent reaching from home to religious places	93	3.19	1.191	4.86				Significant
		How long	93	4.67	1.067	7.24				Significant

		(min) do you spent reaching from home to Administration								
		How long (min) do you spent reaching from home to Leisure Activities	93	3.01	1.315	4.44				Significant
		How long (min) do you spent reaching from home to Station	93	1.81	.472	2.28				

Source: Calculated Based on the Field Survey. 2020

Table 5 MCC Costumers, Passer-by and Vehicle driver activated by uses/ activates, and challenged on to the study area.

	Descriptive Statistics	Rank	Test Statistics	
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Area	Group	Variables	N	M	SD	Friedman Mean Rank	Chi-Square	df	Asymp. Sig.	Kendall's (W)	Inference
MC C	Costumer s	What activity attract you to move toward to this area?	22	1.95	1.362	1.34	17.256	2	0.000	0.392	Significant
		What type of mode of transport have you used to reach hear?	22	4.05	2.011	2.18					Significant
		what type of additional uses have you required proposed to be available in the study area?	22	5.77	2.671	2.48					Significant
	Passer by	What activity attract you to	80	4.16	1.107	2.06	4.067	2	.131	0.025	Non-Significant

		come to this area?									
		What type of activity undertaking when you stay here?	80	4.18	1.111	2.08				Non-Significant	
		What makes you uncomfortable when you walk in this area?	80	3.88	2.058	1.86				Non-Significant	
	Vehicle driver	What is the challenges when you drive a car?	81	1.64	1.417	1.71	20.863	2	.000	0.129	Significant
		What is the challenges when you Park a car?	81	2.14	1.498	1.96					Significant
		What is the challenges when you Shopping?	81	2.70	1.553	2.33					Significant

Source: Calculated Based on the Field Survey. 2020

Table 6 MC Costumers, Passer-by and Vehicle driver attracted with activates/ uses, and challenged in the study area.

Area	Group	Descriptive Statistics				Rank	Test Statistics				Inference
		Variables	N	Mean	Std. Deviation	Fride man Mean Rank	Chi-Square	df	Asymp. Sig.	Kendall's (W)	
MC	Costumers	What activity attract you to move toward to this area?	17	3.82	2.270	1.76	1.754	2	0.416	0.052	Non-significant
		What type of mode of transport have you used to reach hear?	17	4.82	.728	2.03					Non-significant
		what type of additional	17	4.94	2.249	2.21					Non-significant

		uses have you required proposed to be available in the study area?									
Passer by		What activity attract you to come to this area?	81	3.95	1.359	2.03	0.519	2	.771	0	Non-significant
		What type of activity undertaking when you stay here?	81	3.73	1.605	1.94					Non-significant
		What makes you uncomfortable when you	81	4.27	2.641	2.02					Non-significant

		walk in this area?									
Vehicle driver		What is the challenges when you drive a car?	81	4.19	3.249	2.07	7.252	2	.027	0.05	significant
		What is the challenges when you Park a car?	81	3.46	2.013	1.78					significant
		What is the challenges when you Shopping?	81	4.20	2.003	2.15					significant

Source: Calculated Based on the Field Survey 2020.

Table 7 SC Costumers, Passer- by and Vehicle driver attracted with activates/ uses, and challenged in the study area.

Area	Group	Descriptive Statistics				Rank	Test Statistics				Inference
		Variables	N	Mean	Std. Deviation	Frideman Mean Rank	Chi-Square	df	Asymp. Sig.	Kendall's (W)	
SC	Costumers	What activity attract you to move toward to this area?	17	3.82	2.270	1.76	1.754	2	0.416	0.052	Non-significant
		What type of mode of transport have you used to reach hear?	17	4.82	.728	2.03					Non-significant

		what type of additional uses have you required proposed to be available in the study area?	17	4.94	2.249	2.21					Non-significant
	Passer by	What activity attract you to come to this area?	144	3.62	1.429	1.89	14.566	2	.001	0.051	Significant
		What type of activity undertaking when you stay here?	144	3.66	1.354	1.90					Significant

		What makes you uncomfortable when you walk in this area?	144	4.65	2.690	2.Sc					Significant
	Vehicle driver	What is the challenges when you drive a car?	144	2.61	2.863	1.88	19.703	2	.000	0.068	Significant
		What is the challenges when you Park a car?	144	2.38	1.873	1.87					Significant
		What is the challenges when you Shopping?	144	3.Sc	2.143	2.25					Significant

Source: Calculated Based on the Field Survey 2020.

Table 8 AGJ Costumers, Passer- by and Vehicle driver attracted with activates/ uses, and challenged in the study area.

Area	Group	Descriptive Statistics				Rank	Test Statistics				Inference
		Variables	N	Mean	Std. Deviation	Frideman Mean Rank	Chi-Square	df	Asymp. Sig.	Kendall's (W)	
AGJ	Costumers	What activity attract you to move toward to this area?	24	2.67	1.736	1.48	12.0Sc	2	0.002	0.250	Significant
		What type of mode of transport have you used to reach hear?	24	4.6667	1.30773	2.06					Significant
		what type of additional uses have you required	24	5.17	2.632	2.46					Significant

		proposed to be available in the study area?									
Passer by		What activity attract you to come to this area?	93	3.42	1.924	1.84	21.913	2	.000	0.118	Significant
		What type of activity undertaking when you stay here?	93	3.25	1.880	1.81					Significant
		What makes you uncomfortable when you walk in this area?	93	4.97	2.849	2.35					Significant

	Vehicle driver	What is the challenges when you drive a car?	93	2.33	2.213	1.73	13.668	2	.001	0.073	Significant
		What is the challenges when you Park a car?	93	2.88	1.799	2.08					Significant
		What is the challenges when you Shopping?	93	3.05	1.879	2.19					Significant

Source: Calculated Based on the Field Survey 2020.

Table 9. Summary test result of residences, costumers, passersby, and vehicle drivers Freedman ANOVA test post hoc and Kendall's coefficient of concordance (W)

Study area	Group	Variables	N	Average Mean	Chi-square	df	p-value	W	Inference
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MCC	Residences	Menes transportation Residence used	78	3.68	121.6Sc	2	< 0.001	0.78	Significant
		Time spent reaching from home to different uses/ activities	78	3.53	105.195	7	< 0.001	0.193	Significant
MC	Residences	Menes transportation Residence used	81	3.49	46.147	2	<. 001	0.285	Significant
		Time spent reaching from home to different uses/ activities	81	3.67	114.972	7	<. 001	0.202	Significant
SC	Residence	Menes transportation Residence used	124	3.88	100.635	2	<. 001	0.741	Significant

		Time spent reaching from home to different uses/ activities	124	4.2	100.635	7	<. 001	0.166	Significant
AGJ	Residence	Menes transportation Residence used	93	3.46	12.0Sc	2	<. 05	0.684	Significant
		Time spent reaching from home to different uses/ activities	93	3.07	256. 162	7	<. 001	0.393	Significant

Source: Calculated Based on the Field Survey 2020.

Appendix A: Homogeneity, Reliability, Correlation and Normality test.

Table 10. Homogeneity of variance result of MCC, MC, SC and AGJ

MCC-Homogeneity of Variances test

Variables	Levene`s Statistic	df1	df2	Sig.
Drive from outside the living area for basic human needs	0.004	1	79	0.953

How often do you travel?	0.236	1	79	0.628
What means of transportation do you use?	0.093	1	79	0.761
Are you feel comfortable in the existing land use that available in your neighborhood ?	0.005	1	79	0.946
If yes, Why?	1.203	1	49	0.278
If no, Why?	1.715	1	30	0.2
Use or uses that are disturbing you and your neighborhood	0	1	79	0.998
If no, why?	0.001	1	69	0.975
If yes, why?	3.258	1	8	0.109
How long do you spent reaching from home to Commerce (Traditional or Supper market, Shop) (in min).	1.002	1	79	0.32
How long do you spent reaching from home to Public Services (Bank, clinic, Pharmacy, Workshop,) (in min).	0.83	1	79	0.365
How long do you spent reaching from home to School (in min).	0.054	1	79	0.817
How long do you spent reaching from home to religious places (in min).	0.21	1	79	0.648

How long do you spent reaching from home to Administration (in min).	0.254	1	79	0.616
How long do you spent reaching from home to Leisure Activities (in min).	0.066	1	79	0.799

MC Homogeneity of Variances test

Variables	Levene`s Statistic	df1	df2	Sig.
Why did you prefer this area	1.271	1	79	0.263
Do you drive outside for basic human needs	1.43	1	79	0.235
How far do you travel in km?	0.307	1	79	0.581
How often do you travel?	0.006	1	79	0.94
What means of transportation do you use?	0.064	1	79	0.802
What type of problems that are currently facing; because of mixing different functions?	1.198	1	79	0.277

SC - Homogeneity of Variances test

Variables	Levene`s Statistic	df1	df2	Sig.
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How far do you travel in km?	0.01	1	120	0.921
How often do you travel?	0.214	1	120	0.644
If yes, explain	0.735	1	120	0.393
What means of transportation do you use?	0.164	1	120	0.686

How long (min) do you spent reaching from home to

Work place, office.	0.001	1	126	0.97
Commerce (Traditional or Supper market, Shop)	0.49	1	126	0.485
Public Services (Bank, clinic, Pharmacy, Workshop,)	0.907	1	126	0.343
School	2.57	1	126	0.111
Administration	0.576	1	126	0.449
Leisure Activities	2.609	1	126	0.109
Station	2.178	1	126	0.142

AGJ - Homogeneity of variances test

Variables	Levene`s Statistic	df1	df2	Sig.
Distance travel	0.052	1	88	0.82
Mode of transportation	2.49	1	88	0.118
Uses and activity that residence preferring next to their house.	0.256	1	88	0.614

Uses and activity that disturbing you and your neighborhood.	1.571	1	88	0.213
Problems that are currently facing because of mixing different functions	0.89	1	88	0.348

Time spent residence reaching from home to different places such as:-

Work, office	2.711	1	88	0.103
Commerce (Traditional or Supper market, Shop)	0.092	1	88	0.763
Public Services (Bank, clinic, Pharmacy, Workshop,)	0.001	1	88	0.981
Elementary School	0.236	1	88	0.628
Religious places	0.786	1	88	0.378
Administration	0.216	1	88	0.643
Leisure Activities	0.121	1	88	0.728
Transport Station	0.45	1	88	0.504

Source: Calculated Based on the Field Survey 2020.

Table 11. Reliability test result of MCC, MC, SC and AGJ

Main City Center (MCC)		
Constructs	No. of Items	Alpha(α)
Distance and Time Spent	7	0.77
Main corridor (MC)		
Constructs	No. of Items	Alpha(α)

Distance	3	0.763
Time Spent	8	0.718
Secondary Corridor (SC)		
Constructs	No. of Items	Alpha(α)
Distance	3	0.777
Time Spent	8	0.76
Around AGJ Junction (SGJ)		
Constructs	No. of Items	Alpha(α)
Distance and rate of travel	3	0.709
Time spent reached to different uses	8	0.738

Source: Calculated Based on the Field Survey 2020.

Table 12. Correlation matrix of time spent reaching from home to different public place.

MCC - Correlation matrix

Variables	1	2	3	4	5	6	7
1 Commerce	1						
2 Public Services	.589**	1					
3 Elementary School	.673**	.453**	1				
4 Religious places	0.064	0.145	0.151	1			

5	Administration	0.086	.321**	.Sc4*	.314**	1		
6	Leisure Activities	.401**	.561**	.467**	0.083	.352**	1	
7	Transport Station	0.214	.347**	0.208	0.052	.253*	.465**	1

*. Correlation is significant at the 0.05 level (2-tailed).

** . Correlation is significant at the 0.01 level (2-tailed).

MC- Correlation matrix

Variables	1	2	3	4
1 Residence travel outside from their living area for basic human needs	1			
2 Distance travel (in km)	.794**	1		
3 Rate of travel	.796**	.812**	1	
4 Mode of transportation residences use	-.933**	-.690**	-.717**	1

** . Correlation is significant at the 0.01 level (2-tailed).

Correlation matrix of time spent reaching from home to different public service or place

Time spent (Min)	1	2	3	4	5	6	7	Total
1 Work place,	1							
2 Commerce	0.181	1						

3	Public Services	0.181	.420**	1					
4	Schools	0.077	0.025	0.168	1				
5	Religious	0.159	0.079	0.124	.268*	1			
6	Administration	0.07	-0.007	.316**	0.177	.383**	1		
7	Leisure activities	.Sc6*	.376**	.621**	.Sc6*	.391**	.332**	1	
8	Transport Station	0.105	0.054	.403**	.350**	.291**	.600**	.444**	
	Total	.447**	.368**	.646**	.475**	.552**	.655**	.747**	1

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

SC - Correlation matrix

Items	1	2
1 Distance travel (in km)	1	
2 Rate of travel	.438**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Correlation matrix of time spent reaching from home to different public service or place

	How long do you spent reaching from home to (in min)	1	2	3	4	5	6	7
1	Commerce (Traditional or Super market, Shop)	1						
2	Public Services (Bank, clinic, Pharmacy, Workshop,)	.367**	1					
4	School	.292**	.244*	1				
4	religious places	0.095	.414**	0.106	1			
5	Administration	.435**	.467**	.266**	.339**	1		
6	Leisure Activities	.385**	.421**	.285**	.367**	.547**	1	
7	Transport Station	.372**	.406**	.294**	0.159	.590**	.417**	1

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

AGJ - Correlation Matrix									
Time spent reaching from home to	1	2	3	4	5	6	7	8	9

1	Work place, office.	1							
2	Commerce (Traditional or Supper market, Shop)	.423**	1						
3	Public Services (Bank, clinic, Workshop,)	.049	.248*	1					
4	School	.079	.164	.480**	1				
5	Religious places	.043	.238*	.453**	.404**	1			
6	Administration	.280**	.315**	.237*	.319**	.386**	1		
7	Leisure Activities	.402**	.443**	.162	.010	.321**	.589**	1	
8	Station	.216*	.303**	.292**	.184	.323**	.165	.162	1
9	Total	.458**	.408**	.308**	.339**	.Sc9*	.448**	.509**	.307** 1

Table 13. Normality test result of MCC, MC, SC and AGJ

MCC - Test of normality

Variable	Mean	SD	Sk	Ku
How far do you travel in km?	4.03	1.423	-1	-0.71
How often do you travel?	1.77	0.772	0.43	-1.19
Means of transportation do residence use	5.24	0.724	0.86	0.894
Use or uses that are disturbing your neighborhood	7.17	3.051	0.17	-0.75

Time spent residence reaching from home to different places				
Work place, office.	3.68	1.694	-0.236	-0.574
Commerce (Traditional or Supper market, Shop)	3.73	2.118	0.48	-0.51
Public Services (Bank, clinic, etc.,)	3.49	2.137	0.64	-0.29
School	3.58	1.732	0.14	-0.46
Religious places	4.24	1.745	0.47	0.019
Administration	4.36	1.974	0.47	-0.38
Leisure Activities	2.99	1.632	0.98	1.026
MC- Test of normality				
Variable	Mean	SD	Sk	Ku
Residence travel outside from their living area for basic human needs	1.31	0.465	0.844	-1.321
Distance travel in (km)	4.37	2.058	-0.048	-1.487
Rate of travel	2.38	1.365	0.268	-1.601
How long residence spent reaching from home to (min)				
Work place, office.	3.81	1.872	0.98	1.493
Commerce (Traditional or Supper market, Shop, etc.)	2.69	1.045	1.127	1.367
Public Services (Bank, Clinic, Pharmacy, etc.)	3.1	1.125	0.774	1.044
Schools (Nursery, Kindergarten, Elementary)	3.15	1.314	1.04	1.328

Religious places (Church, Mosque, others)	4.28	1.Sc7	0.018	-0.018
Administration (Kabele, Sub-city, Court house,)	4.64	1.683	0.457	-1.193
Leisure activities (Public Park, Café, Hotel, etc.,)	3.52	1.59	0.893	0.239
Transport Station (Taxi, Bus, LRT, others)	4.15	2.367	0.167	-1.488

SC - Test of Normality

Variables	Mean	SD	Skewness	Kurtosis
Distance travel of residence (in Km)	4.9	0.887	-1.44	6.31
Rate of residence travel outside their neighborhood	1.96	1.015	1.313	1.621
Means of transportation residence used	4.78	1.048	-2.738	7.692

How long residence spent reaching from home to (in min)

Work place, office.	5.13	2.566	0.403	-0.824
Commerce (Traditional or Supper market, Shop)	3.89	1.968	0.498	-0.52
Public Services (Bank, clinic, Pharmacy, Workshop,)	3.42	1.702	0.749	0.339
School	4.36	2.143	1.054	0.825
religious places	3.90	1.579	0.955	1.731
Administration	4.73	2.195	0.441	-0.818
Leisure Activities	4.85	2.517	0.282	-1.232
Transport Station	3.33	1.983	0.955	0.265

AGJ - Test of normality

Variables	Mean	S.D	Skewness	Kurtosis
How far do you travel in km?	4.30	1.25	-0.13	0.93
mode of transport	0.29	0.201	0.63	1.02
use or uses are you preferring next to your house	3.65	2.77	0.36	-1.55
use or uses that are disturbing you and your neighborhood	5.14	2.87	0.08	-1.07
problems that are currently facing because of mixing different	6.05	4.82	0.8	-0.49
Time spent residence reaching from home to different places such as:-				
Work, Office, etc.,	0.365	0.329	0.127	-1.36
Commerce (Traditional or Supper market, Shop)	2.92	1.17	0.11	-0.695
Public Services (Bank, clinic, Pharmacy, Workshop,)	2.38	0.696	0.324	0.025
Elementary School	3.4	0.941	-0.304	0.771
religious places	3.13	0.957	0.275	-0.324
Administration	4.68	0.941	-0.624	5.69
Leisure Activities	3.09	1.26	0.51	0.541
Transport Station	1.84	0.478	-0.463	0.701

Source: Calculated Based on the Field Survey 2020.

Appendix 3: Socio-demographic Profile of Respondents

Appendix B: The Planners academic level and demographic characteristics.

Table 14. The planners and professionals' academic level and demographic characteristics.

Location		
Items	Frequency	Percent
Main city Center	10	20.0
Main corridor	11	Sc.0
Twenty two	12	24.0
AGJ	11	Sc.0
Gender		
Male	35	70.0
Female	9	18.0
Age		
18 up to 30	29	58.0
31 up to 60	14	28.0
above 61	1	2.0
Academic background		
Diploma	1	2.0
Degree and above	43	86.0
Occupation		

Unemployed	6	12.0
Government employee	28	56.0
Self-employee	10	20.0
Profession		
Urban and regional Planner	2	4.0
Urban planner	14	28.0
Architect	9	18.0
Architect Planner/Housing expert	4	8.0
Urban planner and developer	3	6.0
Others	10	20.0
Not specify	2	2.0
Work experience in years		
Graduate	5	11.4
Two up to five	8	18.2
Six up to ten	15	34.0
Eleven up to Fifteen	11	25.0
Sixteen up to twenty	5	11.4
Total	44	100

Appendix C: Demographic Characteristics of the Household Sample.

Table 15. Demographic Characteristics of the Household Sample

	MCC		MC		SC		AGJ	
Gender								
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Male	43	53.1	43	53.1	63	49.2	51	52.1
Female	38	46.9	38	46.9	65	50.8	45	46.9
Total	81	100	81	100	128	100	96	100
Age of respondents								
18-27	21	25.9	43	53.1	39	30.5	30	31.3
28-37	33	40.7	25	30.9	45	35.2	40	41.7
38-47	14	17.3	6	7.4	Sc	17.2	16	16.7
48-57	8	9.9	1	1.2	16	12.5	6	6.3
58-67	3	3.7	1	1.2	3	2.3	2	2.1
68-77	2	2.5	0	93.8	1	0.8	2	2.1
Missing System	0	0	5	6.2	2	1.6	0	0
Total	81	100	81	100	128	100	96	100
Education								
Illiterate	1	1.2	2	2.5	4	3.1	2	2.1

Read and write	2	2.5	4	4.9	6	4.7	1	1
Grade 1 up to 8	9	11.1	9	11.1	11	8.6	9	9.4
Grade 9 up to 12	13	16	7	8.6	12	9.4	14	14.6
Diploma	32	39.5	32	39.5	54	42.2	37	38.5
Degree and above	24	29.6	26	32.1	41	32	33	34.4
Missing System	0	0	1	12	0	0	0	0
Total	81	100	81	100	128	100	96	100
Job Status								
Business	5	6.2	16	19.8	20	15.6	29	30.2
Engineering (graphics, Artist)	5	6.2	1	1.2	6	4.7	3	4.1
Social Science (economist, accountant,)	3	3.7	3	3.7	12	9.4	12	12.4
Secretarial, Social Work	6	7.4	3	3.7	7	5.5	18	18.8
Others (Driver, teachers)	12	14.7	2	2.5	7	5.4	13	13.6

Nursing, public health, Doctor, , Pharmacists, Public/Health Admin	0	0	1	1.2	9	7	0	0
Students	12	14.8	8	9.9	5	3.9	4	4.2
No job	0	0	4	4.9	13	10.2	0	0
No response	38	46.9	43	53.1	44	34.4	16	16.7
Total	81	100	81	100	128	100	96	100
House hold size								
Single	4	4.9	7	8.6	6	4.7	12	12.5
Paired	16	19.8	8	9.9	13	10.2	7	7.3
Three	16	19.8	18	Sc.2	21	16.4	23	24
Four	10	12.3	19	23.5	24	18.8	15	15.6
Five	6	7.4	21	25.9	27	21.1	13	13.5
Six	5	6.2	6	7.4	21	16.4	15	15.6
Seven	4	4.9	1	1.2	8	6.3	7	7.3
Eight and above	4	4.9	1	1.2	8	6.3	4	4.2
No response	16	19.8	0	0	0	0	0	0

Total	81	100	81	100	128	100	96	100
House ownership								
Government	26	32.1	4	4.9	10	7.8	0	0
Private	16	19.8	16	19.8	42	32.8	8	8.3
Kebele/ Public	24	29.6	25	30.9	39	30.5	52	54.2
Rental House	14	17.3	36	44.4	36	28.1	33	34.4
Others	1	1.2	0	0	1	0.8	3	3.1
Total	81	100	81	100	127	100	96	100

Appendix D: The demographic makeup of the key informants across all study sites.

Table 16. The demographic makeup of the key informants across all study sites.

No	Expert	Responsibility	Level of Education	Years of experience
I. Addis Ababa plan commission office				
1	Senior planner	city planner	Ms	12
2	Senior Planner	Spatial Planning Department head	Ms	9
3	Senior Planner	D manager, Campus AEPED Consulting Plc	Ms	36
4	Senior Planner	Expert, Team leader, Managing Director, General Manager, Commissioner	PhD	37

5	Senior Planner	Land administration office head	Ms	30
6	Senior Civil Engineer	Infrastructure Department head	Ms	17
7	Senior Civil engineer	Infrastructure team leader	Ms	8
8	Senior Planner	Manager, lecturer, expert, Consultant	Ms	35
9	Senior Planner	Manager, lecturer, expert, Consultant	Ms	37
10	Senior Planner	Expert, Team leader, Managing Director	Ms	33
II. Bole sub city Planning Office				
1	Urban Planner	City administrative team leader	Bs	5
2	Urban Planner	Senior spatial and GIS expert	Ms	7
III, Kir-kose sub city planning office				
1	Urban Planner	City administrative team leader	Ms	8
2	Urban Planner	Junior Planner	Bs	4

Appendix 4:Data collection instrument

Appendix E: Questioner for Planner

Objective: I Identify the challenge and assess the impact of UMLP on social, economic, physical, and environmental development.

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n

Please indicate your feelings about the discussion issue presented and the raised ideas by placing a check mark on the appropriate line. 1 = Strongly disagree (SD); 2 = Disagree; 3 = Slightly disagree ;4 = Slightly agree; 5 = Agree; 6 = Strongly agree (SA)

Table 17. Normative evaluation criteria for physical development.

Physical	1	Effectiveness	The goals of UMLP were successfully reflected in the planning tools. UMLP realized its desired outcomes. There is a correlation between the UMLP policy and the current state of physical development.
	2	Performance	UMLP more important than any other type of planning and development.
	3	Efficiency	UMLP assigns the most appropriate functions to specific locations, organizing a mutually supportive mix of uses over a long period. This facilitates better distribution of functions.
Tab	4	Equity	UMLP has fair distribution of service through the study area UMLP allocate urban service in appropriate location UMLP distributed urban service in balance and uniformly way. UMLP available urban service in comfortable distance.
	5	Acceptability	Mixed use is most likely land use Development for city Addis
	6	Institutional arrangements	UMLP has highly integrated, better management and control among institutions.

18. Normative evaluation criteria for Social development

Develop ment	Code	Norma tive criteria	Questioner	1	2	3	4	5	6
Social	1	Effective ness	UMLP have a positive result of their activities on social development						
			UMLP have a negative result of their activities on social development						
			MLD has socially preferable outcomes						
	2	Perform ance	MLD has socially preferable outcomes						
			UMLP favor some group of the city dwellers.						
	3	Efficiency	UMLP is maximization of the social development result.						
	4	Equity	UMLP has the quality of social equity.						
			MUD is highly dependent on and intertwined with the norms, values, and cultures of a society.						
			the design and implementation of MLD has high degree of social						
	5	Acceptability	acceptability (affected people)						
MUD has High political acceptability (decision-makers).									

		MUD has low level of acceptance or unpopularity.
6	Institutional arrangements	UMLP decrease uncertainties in human interaction
		When implement MUD planning institutions has considered cultural, political and legal contexts.

Table 19. Normative evaluation criteria for economic development

Development	Code	Normative criteria		Questioner						
				1	2	3	4	5	6	
Economical	1	Effectiveness	UMLP has an Indicator of faller in economic development							
	2	Performance	UMLP application make successful Economic development							
	3	Efficiency	UMLD could be achieved better economic outcomes							
	4	Equity	The implementation of UMLD may have better economic effect on different people							
	5	Acceptability	MUD has High economical acceptability							
	6	Institutional arrangements	Planning institutions have enough financial resource capacity for administrative and implementation							

Table 20. Normative evaluation criteria for Environmental development

Development	Code	Normative criteria	Questioner	1	2	3	4	5	6
Environmental	1	Effectiveness	UMLP has a Negative result of their activities on the environment.						
			UMLP has a positive result of their activities on the environment.						
	2	Performance	The mixity of use varying from time to time? Controlling the type of use is difficult or no clear regulation instrument.						
	3	Efficiency	MUD has an effect on environment.						
	4	Equity	MUD enhance the concept of environmental preservation concept.						
	5	Acceptability	MUD has high environmental acceptability						
6	Institutional arrangements	UMLP has Environmentally designed and planed for the intended objectives.							

Appendix F: Questioners for Residence and Local Community

To gauge the overall perception of the study area regarding the topic in question, we're looking to assess the opinions of a diverse group, which includes customers and people passing by, such as pedestrians, cyclists, and motorists.

Residents (Live, Work, Play)

1. Is your residence here permanent? Yes No
2. Why did you prefer this area of the city to live permanently?

3. Do you drive outside from your neighborhood for basic human needs?
Yes No
- 3.1 If yes, explain _____
4. How far do you travel in km? _____
- 4.1 How often do you travel? _____
- 4.2 What means of transportation do you use? _____
5. What kind of use or uses do you prefer near your house?
Specify _____
6. Are you comfortable with the existing land uses available in your neighborhood? Yes No
- 6.1 If yes, Why? _____
- 6.2 If no, Why? _____
7. What type of use or uses are disturbing you and your neighborhood?
Specify _____
8. Have you participated in urban planning and development (by providing comments, suggestions, etc.)
when preparing a structural plan? Yes No
- 8.1 If yes, what was your role? Please specify _____
- 8.2 If no, why? Please specify _____
9. How long does it take you to get from home to work (in minutes)?

No	Activities (in min)										Remark

9.1	Working place Office									
	Other									
9.2	Commerce Traditional market									
	Super Market									
	Shops									
	Other									
9.3	Public Services									
	Bank									
	Clinic									
	Pharmacy									
	Workshop									
	Other									
9.4	School Nursery									
	Kindergarten									
	Elementary									
9.5	Other									
	Religious Church									
	Mosque									

	Other									
9.6	Administration Kebele,									
	Police station									
	Court house									
	Other									
9.7	Leisure activities Sport field/									
	Play ground									
	Park									
	Indoor game									
	Café,									
	Restaurant									
	Bar									
	Other									
9.8	Station Bus									
	Taxi									
	LRT									
	Other									

NB: If you a check mark on other write the exact activity on remark.

Customers (Accessibility, Distance, Activity)

1. What activities have drawn you to this area? Please be specific. _____

2. What mode of transport did you use to get here? _____
3. How long does it take you to get from your house to this location? _____
4. Is it easy to get to this study area? Yes No
- 4.1. If no, why _____
5. Is there any contaminant that bothers you while you're in this area?
Yes No
- 5.1. If yes, specify it _____
6. Is there anything physical that could be an impediment as you go
through this area? Yes No
- 6.1 If yes, specify it _____
7. Do you have every function required for fundamental needs in this area?
 Yes No
- 7.1. If not, what new applications have you recommended for the study area?
Please specify _____

Passer - by - Pedestrians, Customers (Accessibility)

1. What activities attract you to visit this area? _____
2. What kinds of things do you intend to undertake while you're here? _____
3. What are your interests in this research area? _____
- 3.1 Why? _____
4. What do you dislike in this area? _____
- 4.1 Why? _____
5. What makes you feel uneasy when you walk through this area? _____
6. How long do you plan to remain in this area?? _____

Car driver, 2 or 3 wheels' vehicles

1. What do you feel when you drive or ride in this area?
A/ Comfortable B/ Relaxed C/ Fear (Crime, Traffic)
- 1.1 Specify if more _____
2. What are the challenges when you:
Drive a car _____

Stop a car _____
Park a car _____
Shopping _____ in this area?

Appendix G: Questionnaires and interviews for key informants

Part 1: Demographic Characteristics of the Respondent

Code _____

Gender: Male Female

Age in years: 18-29 years 31-60 years Above 61

Level of education

Illiterate Read and write Grade 1-8 Grade 9-12

College Diploma Degree and above

Occupation: _____

Unemployed Government employee Self employee

Others (specify) _____

6. work experience _____

7. Other details _____

Objectives

Questioners Related to Asses and examine the impact of mixed urban land use planning on spatial development the case of the selected core, transitional and suburban areas of Addis Ababa city.

Thematic areas: Policy, Regulation, Strategies,

1. What are the factors that urged the mixing of urban land use development in the case of Addis Ababa?
2. Would you explain Mixed urban land use policy, rule, and regulation of planning and implementation in the core, transition, and suburb areas.
3. Would you explain the criteria and procedures that were agreed upon when the Addis Ababa Master Plan Revision Office (ORAAMP, 2002) decided and developed Mixed Urban Land use planning and development

as urban land use policy?

4. Does state ownership of land holdings affect urban mixed land use planning? Yes, or no? If yes, How? If not, Why?
5. Does state ownership of land holdings affect urban mixed-use development? Yes, or no? If yes, How? If not, Why?
6. Does lease period disparity (90 years for education, health, etc.) affect Mixed urban land use? development? Yes, or no? If yes, How? If not, Why?
7. Does the government favor developers when developing mixed urban land use development projects? Yes, or no? If yes, How? If not, Why?
8. Do you think mixed land use planning and development has comprehensive policy and regulation tools when implementing (managing and controlling) it in the Addis Ababa context? Yes, or no? If yes, How? If not, Why?
9. What are your remarks on Mixed urban land use policy, rule, and regulation of planning and implementation in the core, transition, and suburb areas;

Appendix H: Interview Questioners for Urban Planning Office

Part I. Interview Questioners for Urban Planning office

Research objectives

General objective of this research is:

To analyze the existing state of mixed-use land use planning and its implications for spatial development, Identify and evaluate the impact (both positive and negative) that was made, and then propose potential solutions for mixed urban land use planning as well as development implementation tools (in the instance of Addis Ababa) on selected core, transitional, and suburban city areas.

The specific objectives of the study include the following:

Assess and examine the impact of mixed urban land use planning on the spatial development of the selected core, transitional, and suburban areas of Addis Ababa city. Identify the problem and evaluate the effect of mixed urban land use on spatial (socio-economic, physical, and environmental) development,

Forward possible recommendations for mixed urban land use planning and development to provide a solution for the existing problem.

Specific objectives 1.

Questioners assess and examine the effects of mixed land use planning on spatial development in the core, transitional, and suburban neighborhoods of Addis Ababa.

Thematic areas: Policy, Regulation, Strategies,

1. What was the objective of the Addis Ababa Master Plan (ORAAMP, 2002) office's decision to combine land use planning and development as urban land use policy?
2. What were the criteria and methods used by the Addis Ababa Master Plan Revision Office (ORAAMP) to pick mixed urban land use planning and development as policy?
3. Who is involved as a stakeholder in the revision of the AA Master Plan?
4. Has the Addis Ababa City Plan Commission office evaluated the mixed urban land use planning, Science, and development policy (ORAAMP, 2002)? Yes, or no.
 - 4.1 If so, when? _____
 - 4.2 If not, why not? _____
- 4.3 What were the evaluation criteria for urban mixed-use planning and development?
- 4.4 What was the outcome of the spatial evaluation of urban mixed land use planning and development in the core, transition, and suburb areas of Addis Ababa city?
5. Does state ownership of land holdings affect urban mixed-land use planning and development? Yes, or no? If yes, how? If not, why?
6. Is lease-period disparity (90 years for education, health, etc.) affected by urban mixed land use? development? _____
Yes, or no? If yes, how? If not, why? _____
7. Does the government favor developers who create mixed-use

developments or projects? in an urban area? Yes, or no? _____

If yes, How? If no, Why? _____

8. What are the factors that urged mixed urban land use planning and development in the case of Addis?

Specific objectives 2.

Questioners Concerning Identify the problem and evaluate the impact of mixed urban land use on spatial (social, economic, physical, and environmental) development.

Thematic areas:

- 1 diversity (type and number of uses),
- 2 Intensity (balance and proportion),
- 3 compatibilities (mutuality, synergy, and integration),
- 4 Spatial (social, economic, physical, and environmental) development,
- 5 Land ownership and acquisition

1. What do you understand about the influence of urban land use diversity, intensity, and compatibility in terms of social, economic, physical, and environmental growth?
2. Based on your observations, what are the causes of urban mixed land use planning on social, economic, environmental, and physical development in Addis Ababa's core, transition, and suburb areas?
3. In your perspective, what are the key implications of implementing urban mixed land use planning on social, economic, environmental, and physical development in Addis Ababa's core, transition, and suburb areas?
4. How the existing spatial relationship has affect the urban form of Addis Ababa?
5. What mixed-use development challenges are currently confronting AA cities? How? _____
6. Do urban land acquisition modalities affect mixed urban land use development? Yes, or no? If yes, how? If not, why? _____
7. Is the leasing system encouraging for mixed-use developers? Yes, or no? If so, how? If not, why? _____

8. Has the developer profited from mixed-use development? Yes, or no? If so, how? If not, why? _____

Specific objectives 3.

The questioners enquired about the respondent's probable proposal on the subject of mixed urban land use planning and development tools as a solution to the existing problem.

Do you have any thoughts on the research topic Mixed Urban Land Use Planning and its Impact on Spatial Development: The case of Kir-kose and Bole Sub-city in Addis Ababa?

2. Would you like to recommend how mixed urban land use planning is implemented, managed, and controlled in the selected case study areas with regard to policy, manpower, finance, public participation, and institutional integration?
3. Would you like to make recommendations on how mixed urban land use development is implemented, managed, and controlled in the case study areas in terms of policy, manpower, financing, public engagement, and institutional integration?
4. What are your thoughts as a member of this organization on mixed-use land use planning and its impact on spatial development?

Part I. Interview questioners for Local Administration offices (Sub city)

objectives: - General objective

To assess the current state of mixed urban land use planning and its impact on spatial development, identify and evaluate the impact (both positive and negative), and then forward potential recommendation for mixed urban land use planning as well as development strategies that are intended (the case of Addis Ababa, with special emphasis on selected core, transition, and suburban areas of the city).

Specific objectives 1.

Questioners Concerning Assess and examine the impact of mixed urban land use planning on spatial development in the case of the selected core, transitional, and suburban areas of Addis Ababa city.

Thematic areas: Policy, regulation, strategies,

What are the factors that urged mixed urban land use planning and development in the case of Addis?

2. How does state ownership of land holdings affect mixed-use land use planning and development? Yes, or no? If yes, how? If not, why?
3. Is lease-period disparity (90 years for education, health, etc.) affected by mixed urban land use? development? Yes, or no? If yes, how? If not, why?
- 4 Does the government benefit developers when developing mixed-use development/projects in metropolitan areas? Yes, or no? If so, how? If not , why?

Specific objectives 2.

Questioners Concerning Identify the issue and assess the influence of mixed urban land use on social, economic, physical, and environmental development.

Thematic areas:

- 1 diversity (type and number of uses),
- 2 Intensity (balance and proportion),
- 3 compatibilities (mutuality, synergy, and integration),
- 4 Spatial (social, economic, physical, and environmental) development,
- 5 Land ownership and acquisition

1. What do you understand about the impact of urban land use diversity, intensity, and compatibility on spatial (social, economic, physical, and environmental) development?
2. As per your observation, what are the causes of urban mixed land use planning and implementation? on social, economic, environmental, and physical development in the core, transition, and suburb areas of Addis Ababa city?

3. What are the key implications of urban mixed land use planning, in your opinion at the core, execution of social, economic, environmental, and physical development Transition and suburbia in Addis Ababa?
4. What are the current mixed-use land use planning and development challenges in your sub-city? How?
5. What are the benefits and drawbacks of mixed urban land use planning?

Specific objectives 3.

The questioners inquired what the respondent thought of mixed urban land use planning and development tools as a solution to the existing challenge.

Thematic area: implementation, management, and control of mixed urban land use.

Q 1, 2, and 3: How would you recommend mixed urban land use planning be managed, executed, and controlled in the selected study locations, taking into account policy, personnel, financing, public engagement, and institutional integration?

Q 4, 5, and 6: How would you recommend mixed urban land use Development be managed, executed, and controlled in the selected study locations, taking into account policy, personnel, financing, public engagement, and institutional integration?

7. What should be done to improve mixed-urban land use planning, implementation, management, and control in your sub-city?
8. What is your opinion as a member of this organization about mixed urban land use?9. What general comment you can forward to improve the situation in this regard?

Appendix I: Secondary sources, types of data and information collected.

Table 3.2 Secondary sources, types of data and information collected.

Document	Type of data	Information
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Central Statistical Agency of Ethiopia (CSAE),	Quantitative	Demographic characteristics of study area
The Urban Plan Preparation and Implementation Strategy, (In Hard Copy Only)	Qualitative	Land use planning and development approach in Addis Ababa
The urban planning proclamation of Ethiopia https://lawethiopia.com/images/federal_proclamation/proclamations_by_number/574.pdf	Qualitative	Regulation & policy on urban Area
The Urban Development Policy, http://196.188.93.162/c/document_library/get_file?uuid=65a180a2-7aca-4bde-bb7d-377be1459acf&groupId=10136	Qualitative	Development strategy in different urban area
The Urban Planning Proclamation https://lawethiopia.com/images/federal_proclamation/proclamations_by_number/574.pdf	Qualitative	Land use classification and location
Structure Plan Preparation and Implementation Manual ROAAMP 2002 (In Hard Copy Only)	Qualitative	Urban land use Classification and Service Assignment.
Structure Plan Preparation and Implementation Manual AAPPCO 2017-2027 (In Hard Copy Only)	Qualitative	Urban land use Classification and Service Assignment.

Appendix J: Declaration of Interest Statement

Ethical approval and informed consent

This research paper received ethical approval from the Institute of Architecture, Building Construction, and City Development (EiABC) at Addis Ababa University, Ethiopia. The Ethical Review Board comprised five committee members: Dr. Mintesnot Woldeamanuel (Chair), Dr. Fisseha Wegayehu (Member), Dr. Dipl-Ing Birhanu Woldetensae (Member), Dr. Dagnachew Adugna (Member), and Dr. Liku Workalemahu (Member).

Before collecting primary data through a survey questionnaire, written informed consent was obtained from the Thesis Proposal Evaluation Committee. The Ethical Approval Letter included conclusions, recommendations, and the evaluation results of the Ph.D. thesis proposal.

Subsequently, the university issued cooperation letters to Bole, Kir-kos sub-city, and other relevant institutions for the study. Confidential letters were sent via cellphone and email to individual respondents and offices. After obtaining informed consent from all subjects, individuals, and institutions involved in the study, data collection commenced.

Author contribution statement

Girmachew Tariku: Conceived, designed and performed the research; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Dr Liku Workalemahu: Conceived, developed the research; Examined and interpreted the data; Contributed *reagents*, materials, analysis tools or data; Wrote the paper.

Dr Dagnachew Adugna: Conceived and designed the research; Analyzed and interpreted the data; Wrote the paper.

Affiliations

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This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors/. Additionally, we have no conflicts of interest to report.

Data availability statement

The collected data was filled in hard and soft copy, included, referenced in article. And also the data presented in this study are available in corresponding author and can provide if, the publisher required any time.

Additional information

No additional information is available for this paper.



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Spatial distribution of Urban land-use in Addis Ababa, Ethiopia

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ABSTRACT

This study underlines the critical function of efficient urban land use planning, recommending mixed land use for improved city sustainability. The research, which is rooted in the historical context of urban renewal, attempts to harmonize theoretical frameworks with actual implementation, giving critical insights for policymakers and urban planners in constructing sustainable urban areas. The study identifies a deficit in empirical research on the spatial distribution of urban mixed land use, as well as a gap between theory and real application. Using a mixed-methods approach, it explores mixed land use planning concerns by including stakeholder input and temporal dynamics. Using theoretical frameworks, the study explores land use trends in four Addis Ababa sub-cities. When the null hypothesis of Complete Spatial Randomness is rejected, there is a significant relationship between location and land use functions (statistical chi-square value of 47.763). Finally, the study makes crucial recommendations for purposeful land use distribution in a dynamic urban setting, shedding light on the constraints of mixed land use planning in African urban growth.

ARTICLE HISTORY

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KEYWORDS

Urban land use planning;
mixed land use;
sustainability;
empirical studies

1. Introduction

This study looks at the spatial distribution of urban land use as well as the practical implementation of mixed land use planning. It evaluates the implementation of mixed land use planning in specific locations, matching with theoretical frameworks and assessing the efficacy of planning and development standards. Efficient land use planning is critical for creating sustainable, resilient, and thriving cities by encouraging diversity, minimizing dependency on automobiles (Debrah et al., 2023), and stimulating social connections. The project aims to assist policymakers and urban planners with insights into constructing more livable and sustainable cities.

The 1950s and 60s urban renewal projects and single zoning codes of American cities raised critical questions on urban planning that led the famous Jane Jacobs to coin the

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concept of mixed land use as important for maintaining lively neighborhoods and streets (Fan et al., 2019). This idea and concept later propagated in international programs such as the SMART growth (Gren et al., 2019; Marshet et al., 2019; Song, 2022), the New Urbanism movement (Alice Nilsson, 2017; Kong et al., 2015), and the new urban agenda (Alice Nilsson, 2017; Rudd et al., 2018). Mixed land use promoted with the intention to achieve walkable streets (Babic, 2021; Evans et al., 2016) and inclusive development (Turok et al., 2018), reducing motorized transport use (Huang et al., 2018; Tiwari et al., 2016), increasing proximity to services, public health and local economic benefits (Artmann et al., 2019).

Despite the obvious benefits of mixed land use, some argue that it has resulted in unexpected effects. As a result of mixed land use, problems such as noise, traffic congestion, stressed infrastructure, and overall disorder have been noted. Furthermore, the phenomena has been related to a rise in land surface temperature, which contributes to the formation of urban heat islands (Mondal et al., 2021; Pandey et al., 2022) Furthermore, several studies, notably (Abdullahi et al., 2015) question whether mixed land use has produced the expected favorable consequences.

Mixed land use planning necessitates a comprehensive approach to implementation, led by regulatory mechanisms. Principles such as walkability (Fonseca et al., 2021), mixed-use development, and polycentric urban architectures (Fan et al., 2019) are founded on theoretical frameworks. The Processes of empirical validation investigate how these concepts manifest in urban settings and social interactions. A dynamic feedback loop examines how Smart expansion ideas are translated into sustainable urban expansion strategies. The study recognizes contextual diversity in different locations and examines how the distinctive characteristics of selected locales influence the practical implementation of mixed land use planning. A thorough examination of zoning rules (Y. Li et al., 2022), form-based codes (Kloosterboer, 2019; Singh, 2010), Transit-Oriented Development (TOD) guidelines (Huang et al., 2018), and Public-Private Partnerships guarantees a thorough examination of regulatory tools and their alignment with theoretical frameworks (Fleta-Asín et al., 2020; Wang & Ma, 2021). This integrated approach seeks to bridge the theoretical and practical gaps by providing nuanced insights into the challenges of mixed land use planning and development (Afzalan & Muller, 2018; W. Li et al., 2020; Rahnama et al., 2012).

This research fills important gaps in the existing literature on the spatial distribution of urban mixed land use and functions in urban community block (Oikonomou, 2015). Block is the space within the street pattern of a city that is subdivided into land lots for the construction of buildings (Vialard, 2014; Ye & Dong, 2018). It emphasizes the scarcity of empirical research and the gap between theoretical debates and practical application. The study tries to bridge these gaps by emphasizing the need of extensive theoretical framework investigation in urban development and the requirement for context-specific planning. Furthermore, it actively solicits stakeholder feedback and focuses a special emphasis on comprehending the temporal dynamics inherent in mixed land use planning. The major goal of methodically addressing these critical gaps is to contribute to the progress of urban planning methods.

This study investigates the spatial distribution of urban function, with a focus on mixed-use planning and its emergence from theoretical frameworks. It investigates modern paradigms, such as Carlos Moreno's (Antônio et al., 2016) 15-minute city

concept (Allam et al., 2022), which envisions metropolitan landscapes with everyday essentials within a short commute. The research also looks at notions such as ‘complete streets’ (McAslan, 2017) and ‘transit-oriented development’ (Huang et al., 2018), which promote inclusive streetscapes and development near transportation hubs. The study is especially pertinent to African cities, given their distinct socioeconomic dynamics and historical legacies. The research intends to provide nuanced insights by evaluating the practical implications of mixed land use planning principles and modern concepts in selected African metropolitan environments. The study will make a theoretical and practical contribution to the debate.

The dynamic alteration of Africa’s urban landscape, driven by population increase, urbanization, and economic development, emphasizes the importance of diversified land use for sustainable urban environments (Cobbinah et al., 2015; Garfias; Royo et al., 2022; Slavova & Okwechime, 2016). However, the implementation of this method is inextricably linked to historical legacies and existing policy frameworks. Theoretical frameworks highlight the importance of mixed land use in generating diverse and lively urban environments that support social interaction, economic vigor, and environmental sustainability (Pandey et al., 2022). This study investigates the application of mixed land use planning in selected urban area in Addis Ababa city, specifically how planners integrate theoretical frameworks into decision-making processes.

This research actively contributes to the discourse on African urban development by leveraging insights from existing literature, global urbanization trends, and distinctive case studies. Acknowledging formidable challenges such as informality, poverty, and deficient infrastructure, the study puts forth recommendations aimed at enhancing the effectiveness and contextual relevance of mixed land use regulations. The overarching objective is to promote sustainable and inclusive urban growth in Africa. Through a meticulous analysis of perspectives held by Sub-Saharan African city planners and a comprehensive evaluation of existing regulatory frameworks (Caprotti et al., 2017; UN-Habitat, 2011), this study seeks to illuminate the positioning of planners concerning the concept of mixed land use. By doing so, it endeavors to provide valuable insights that can significantly enrich urban planning strategies in the region.

The literature on mixed land use planning represents both successful and bad implementations, offering crucial insights into best and worst practices. The Best practices can be found in cities such as Copenhagen (Prato et al., 2018) and Vancouver (Shulman, 2021; Wideman et al., 2020), where careful planning has resulted in vibrant and harmonious urban environments (Parhizgar, 2013). However, the literature also identifies problematic practices, most notably in certain American cities where poorly implemented mixed-use zones have resulted in problems and dissonance (Lin et al., 2020; Zhang et al., 2019). Understanding these disparate outcomes highlights the need of context-sensitive design (Rauws, 2017) and community engagement (Dyer et al., 2014; Tavares et al., 2022). This study draws on this literature to inform an in-depth review of planning guidelines, regulatory instruments, and case studies as it digs into the assessment of practical applications. This approach intends to bring useful insights to the area by providing a comprehensive knowledge of the complexity surrounding the success or failure of mixed land use planning initiatives.

Even though urban planning has evolved from rigid master planning and land use zoning to more flexible structure and strategic planning, the mode of operation

of zoning the top-down bureaucratic procedures of controlling land use remains to face similar challenges (Chitrakar et al., 2017). While there are fundamental arguments and critics raising questions on the relevance of imported models and the possibility of meaningful influence of the land use zones on the actual development course in the context of rapid urbanization (Echendu & Claver Chiedozi Okafor, 2021), complex interaction of legal and illegal governance system, and power interplay (Alemie et al., 2015). Acknowledging these challenges, on the other hand others ascertain that the reality does not show an entirely impotence of the planning tools across the board, while there are wide variations as to the level of influence in actual implementation through some sort of negotiation (Berrisford et al., 2018; Goodfellow, 2013).

While with that being said about the overall international experiences and reflections of previous studies, this paper tries to understand what is the situation in Addis Ababa the specific urban planning and development guideline, the regulatory controlling tools employed and their level of influence in the implementation taking a specific local case and draw lessons in light of the above arguments. It aims to contribute to the body of knowledge developed (the above mentioned studies) and compare and contrast with the finding of the previous studies (Table 1).

Table 1. A chronological table documenting Addis Abeba's planned milestones, activities taken, and related references from 1986 to the present. This information is derived via 2020 fieldwork and map analysis.

Year Range	Planning Approach	Purpose of Change	Key Initiative and Concerns	References
1986	Master plan Zoning	Dictate the development of the city for consecutive 20 years	Introduce distinct zoning codes outlining permissible activities in specific zones. Criticized later for lack of flexibility and alignment with changing economic policy.	(Kloosterboer, 2019; ORAAMP, 2002)
2002–2014	Mixed Land Use Development	Address concerns about settlement pattern and decline in quality of life. Encourage Mixed Land Use Development (MLD) to promote urban development.	Introduce MLD as a zoning strategy to induce flexibility and facilitate private investment. Structure plan outlines green infrastructure, main road networks, markets, and services.	(Kloosterboer, 2019; ORAAMP, 2002)
		Establish regulatory mechanisms for urban development, including local Development Plans (LDPs), compatibility matrix,	Potential of LDPs largely untapped due to lack of systematic approach and consistent regulations. Challenges in execution lead to inadequate implementation of LDPs.	(Benti et al., 2022)
	Structured Plan	Shift from a 'strict' masterplan to one allowing on-the-ground flexibility and negotiation for better urban expansion control.	Utilize goal-setting with structured plan and local development plans. Signify a shift in planning strategy.	(Monclús, 2003; ORAAMP, 2002)
2017	Transformation towards MLD	Respond to challenges posed by transformation towards mixed land use.	Note erosion of functional specialization, escalating conflicts among land uses, and blending of diverse activities.	(AACPPO, 2017)
Present	Goal-Setting Approach	Adoption of structured plan and local development plans by Addis Ababa City Government plan commission office.	Control urban expansion and increase inner city redevelopment and infill in main, secondary corridor redevelopment.	from author site survey 2020

In many parts of Addis Ababa, mixed land use zoning planned as the basis for sustainable development (Colding et al., 2020) and smart growth in urban areas (Saaty & De Paola, 2017). These zones believed to attract more populations, which in turn is able to increase economic activity and, as a result, enhance daily commercial activities in the area. Therefore, this was thought to be an excellent way of activating and motivating those areas that were suffering from deterioration in economic status and promoting pedestrian movement. On the contrary, mixed land use has had negative consequences for the community (Bahadure & Kotharkar, 2012; Delisle et al., 2021; Zahnow, 2018) Such as creating noise pollution inside the urban blocks and overcrowding of industrial, commercial, and residential zones that ultimately lead to disturbance of the living as well as the working environment if not managed.

In the process of urban settlement, since the establishment of Addis Ababa from traditional or local (i.e. it refers to the process of urban or rural development and land use management that is rooted in the customs, practices, and values of a particular community, culture, or region) to pure zoning, then modern mixed land use. There were shifting of functional specialization and mixing of different uses in specific area; i.e. changing of planning from zoning to mixing, challenges of Addis Ababa city. Mixed Land-use is defined in functional mix conceptual level point of view. The application of mixed land use planning and development has an impact on urban areas (Cheng & Van Ameijde, 2023; Ewing & Cervero, 2010) Whether, the traditional or planned mixed land use settlements that have been created through traditional or modern mixed land use development affect urban areas. The mixing of uses at a specific site affects the dweller's life positively or negatively. Individuals and communities generate different types of functions that change the built environment; those functions harmonize or create conflicts between competing uses. Thus, how they are planned? What are those development principles, clear guide line and controlling regulation tool? Are major problems that needs a solution at its outgrowth level. There for this study hypothesizes the distribution of land use in selected locations, either randomly or as associated each other?

2. Methods

The study adopts a mixed-methods methodology to analyze the dynamics of land use planning in Addis Ababa's four sub-cities in depth. The research design complies to Creswell's suggestions by utilizing both quantitative and qualitative research methods (Creswell, 2017), allowing for a nuanced examination of urban land use trends. Data is collected from a variety of sources, including maps, surveys, and on-site data, resulting in a strong dataset for analysis. To improve understanding of horizontal land use mix, statistical approaches such as SPSS and ArcGIS are used. The project, which spans 160.29 hectares and spans the years 2002 to 2017, focuses a significant emphasis on ethical issues and transparent reporting, favoring trustworthiness despite potential limits.

The thorough crafting of the methodology is obvious in the deliberate selection of several sub-cities and the incorporation of spatial analysis techniques such as point pattern and quadrant analysis. This not only adds to the study's overall validity by providing insights regarding land use spread. The systematic use of random and stratified

sampling methods, together with a carefully determined sample size, further enhances the study’s findings’ dependability. Ethical considerations and transparency in addressing shortcomings highlight the dedication to rigorous research. The Chi-square test in SPSS is an important component, highlighting the precision used in investigating correlations between geographical locations and functional categories. In final analysis, this well-designed mixed-methods methodology allows for a deep and robust research into the complex dynamics of land use planning in Addis Ababa (Figure 1).

The figure (Figure 2) illustrates different study areas in Addis Ababa, Sourced: from the revised version of the structural plan manual dated May 2012, provided by the Addis Ababa authorities and updated in air Map obtained from EMA, over lay current google earth Map 2023.

It is important to note that when we refer to distance from the center, we specifically denote the straight-line distance from Minilik Square outward to the periphery, providing a precise framework for understanding the spatial relationships of these selected sites.

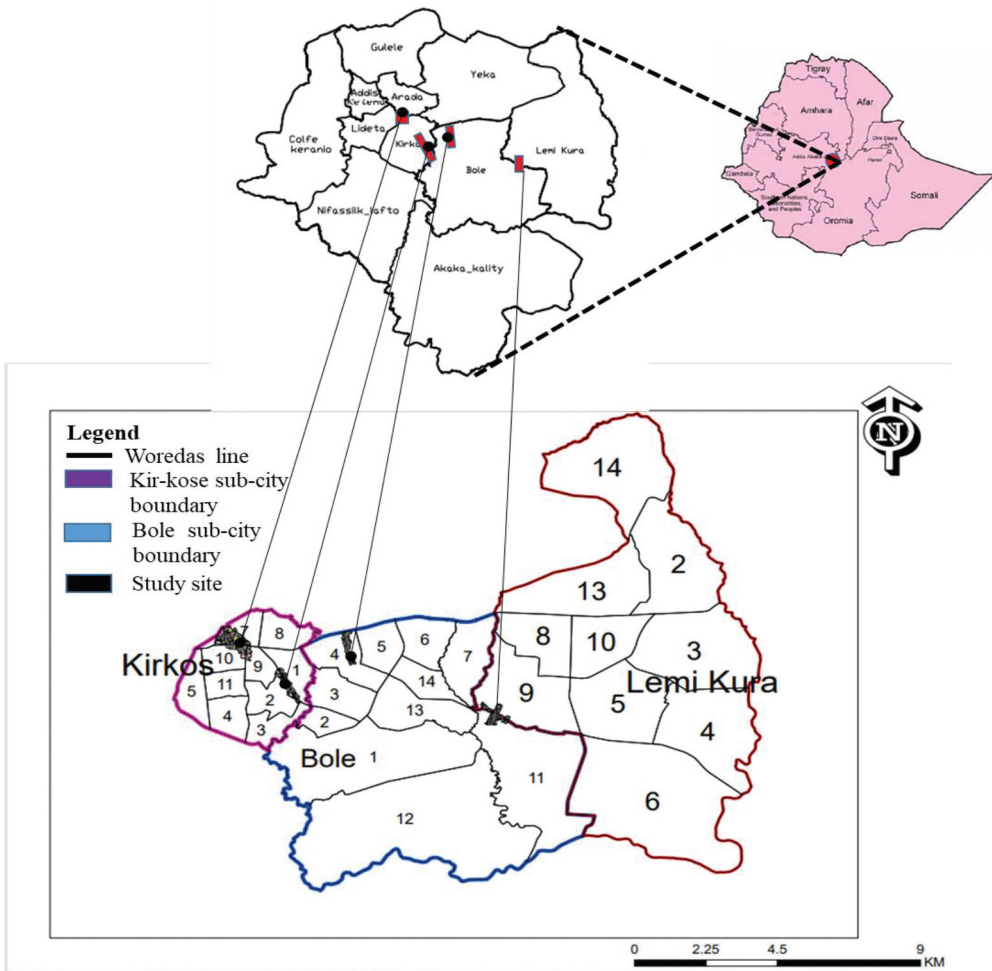


Figure 1. Location map of the study areas in Kir-kose and Bole Sub-cities. Source: from structural plan manual (revised version) May 2012, Addis Ababa.

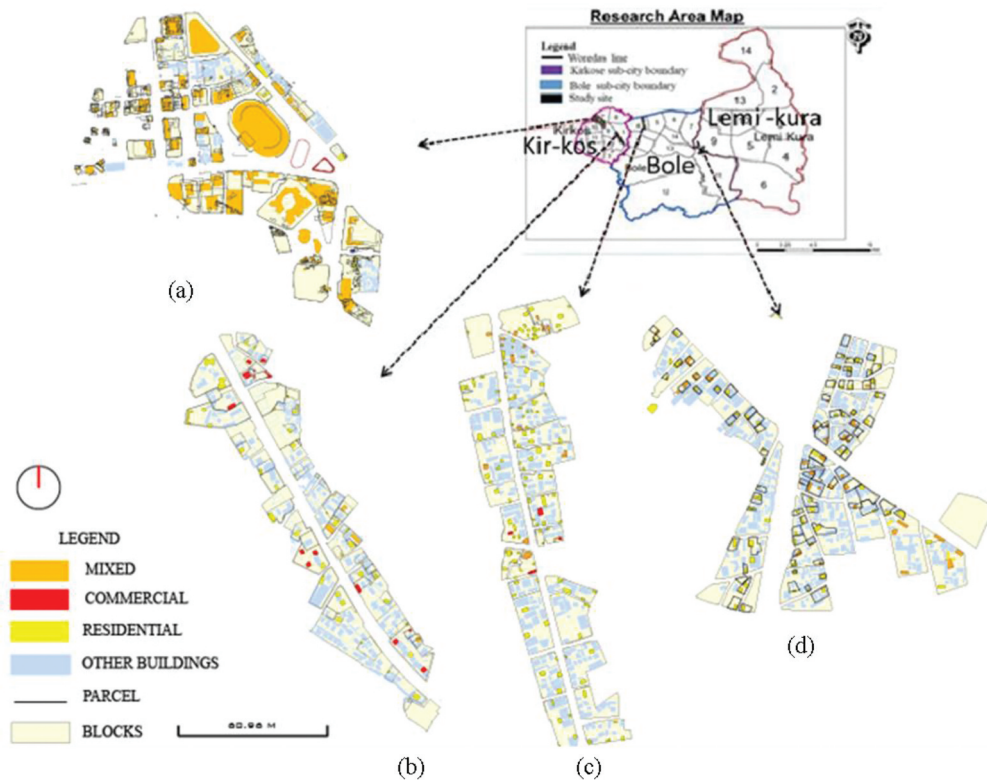


Figure 2. a) each corresponding to a sub-city. The main city center (MCC) map focuses on the legehare study area, encompassing Woreda 6, 7, 9, and 10. b) the main corridor (MC) map pertains to Woredas 1, 2, and 9, commonly known as Africa Street, extending from the Dembel area to the wollo-sefer roundabout. c) the secondary corridor (SC) map features the sub-Arterial Street (SAS) in Woreda 4, known as the '22 roundabout', extending up to the cross junction near the new stadium. d) around goru junction (AGJ), the map covers Woreda 11, locally referred to as 'goru'.

This flowchart (Figure 3) outlines the key steps and components of the research methodology, from the research design to the presentation of findings. It shows the logical flow of the processes involved in the study.

The research design of this study encompasses a mixed-methods approach, drawing on both quantitative and qualitative research methodologies, as elucidated by (Creswell, 2017). Quantitative methods were instrumental in conducting data analysis, while qualitative methods played a crucial role in unraveling the practical applications of mixed land use planning. The study focused on four specific inner and peripheral sub-cities of Addis Ababa, deliberately chosen for their unique characteristics. Residential properties were randomly assigned for investigation across distinct areas, including the Main City Center (MCC), Main Corridor (MC), Secondary Corridor (SC), and Periphery (AGJ). Data collection involved a meticulous combination of maps and on-site surveys, utilizing information from diverse sources such as the Addis Ababa Plan Commission, Ethiopian Mapping Agency (EMA) 2016 Air Map, 2020 physical survey data, and 2023 Google Maps. The integration of these datasets facilitated the creation of a comprehensive map for analysis. To unravel the intricacies of land use patterns, the study employed descriptive

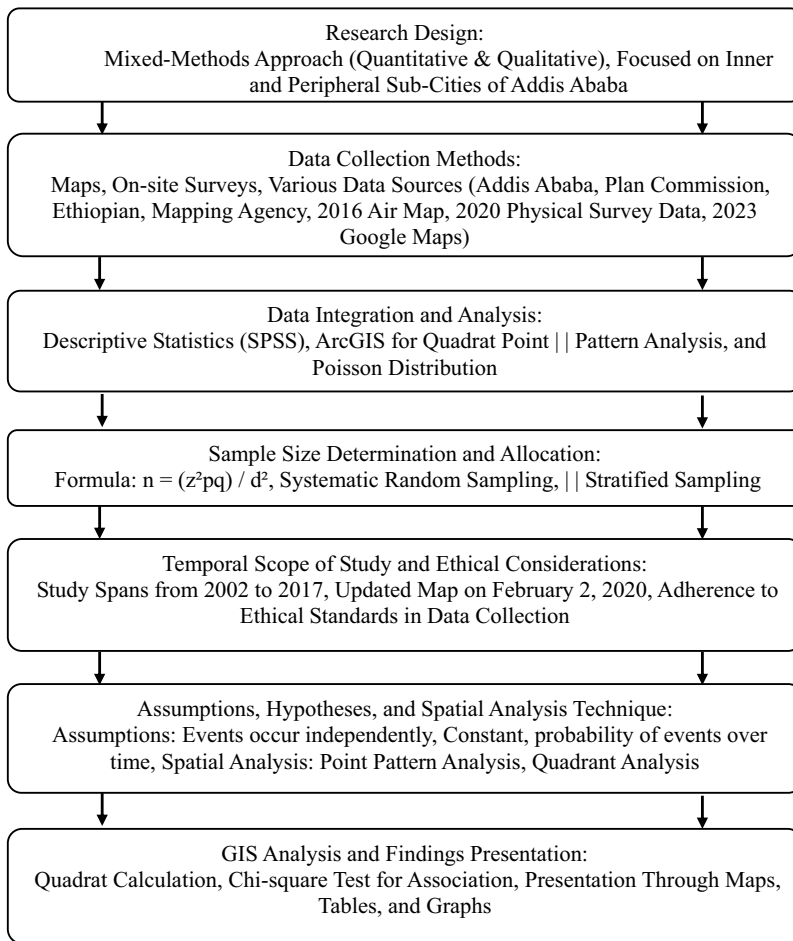


Figure 3. Comprehensive flowchart of the research method.

statistics through SPSS and utilized ArcGIS for quadrat point pattern analysis and Poisson distribution, providing a nuanced understanding of horizontal land use mix. The examination of study areas delved into diverse factors, including proximity to the city center, socioeconomic characteristics, public services, accessibility, land value, street attributes, settlement type, and development time, thereby enriching the analysis with a multifaceted perspective.

The determination of the household sample size involved applying the formula $n = (z^2 pq)/d^2$: $n = (1.96)^2(0.5) (0.5)/(0.05)^2$, $n = 384$. The confidence level (z) was established at 95%, with estimated population characteristics (p) assumed to be 0.5, and the margin of error (d) set at 0.05. This method ensures a reliable and statistically sound sample size for the subsequent data collection and analysis, aligning with established standards in survey research. In the sampling process, a systematic random sampling method was utilized. The sampling interval (K) was determined through the formula $K=nN$, where N represents the population size, and n is the sample size. This approach involved selecting every 'K' element within the population, commencing from a randomly chosen starting point. The systematic nature of the sampling ensures a representative and structured

Table 2. Sample size allocation for sub-Cities.

Name of Sub-City	Targeted Population (houses)	Share of one sub city from targeted population	Study Site	Sample Size (n) (No of houses)
Kir-kos	59,589.80	160.22	MCC	81
			MC	81
Bole	83,225.40	223.77	SC	126
			AGJ	96
Total	142,815.20	384		384

approach to data collection, enhancing the validity of the study's findings. In implementing stratified sampling, the aim was to guarantee comprehensive representation across sub-cities and different areas (Table 2). The stratification formula used for calculating the sample size within each stratum was expressed as $n_i = (n/N) N_i$. This method facilitated a meticulous survey population and sample allocation strategy, ensuring a balanced and well-represented distribution of samples across distinct sub-city categories and areas. The utilization of stratified sampling enhances the precision and reliability of the study's findings by considering the diversity within the larger population.

The temporal scope of this study spans from 2002 to 2017, capturing a comprehensive view of urban land use dynamics. The expansive study area encompasses 160.29 hectares, providing a robust foundation for spatial analysis. To ensure data accuracy and relevance, an updated map meeting specified criteria was generated on 2 February 2020, validating the integrity of the information used in the study. Ethical considerations were paramount throughout the research process, with a commitment to adhering to established standards in conducting surveys and gathering data from households. Recognizing potential limitations, such as biases in random sampling and dependence on existing data sources, the study employs transparency in acknowledging these constraints. Findings are meticulously presented through a combination of maps, tables, and graphical representations, offering a comprehensive framework for assessing both the spatial distribution of urban land use and the practical implementation of mixed land use planning in the selected study areas.

2.1. Assumption and hypothesis

The analysis of events within defined study areas, representing the distribution of commercial, residential, and mixed functions, is grounded in two critical assumptions. Firstly, events (uses) are assumed to occur independently, meaning the occurrence of one event provides no information about the timing of another. Secondly, the probability of an event occurring within a given period remains constant over time. To analyze this, the relationship between the number of observations and the count of events per quadrant is presented for each study site.

2.2. Spatial analysis technique

A multifaceted approach is employed for a comprehensive understanding of the dispersal of applications within a specific region (Table 3). This involves point pattern analysis, spatial arrangement exploration, and rigorous statistical examinations. Quadrant analysis, based on the works of (Antônio et al., 2016; Heyne & Fhoteringham, 2020; Neel et al., 2004), is utilized to scrutinize the degree of clustering or the geographical pattern within the study area.

Table 3. Houses surveyed and quadrat calculation for GIS Analysis.

Study Site	Area of the Study Site (in hectares)	Number of Houses (Events) (n)	Area of Quadrat in Sq m	Number of Quadrants
MCC	70.3	81	121	80
MC	25.72	81	126	80
SC	27.55	126	160	80
AGJ	36.72	96	99	80
Total	160.29	384	506	320

Source: study site survey data, 2020.

This table provides details on the study areas, their respective sizes, the number of surveyed houses, and the parameters for quadrant analysis. Quadrat size calculations, utilizing square quadrats, ensure a balanced approach in spatial analysis, taking into account crucial factors like quadrant size, cell size selection, and grid placement. The quadrant analysis, based on spatial arrangement and statistical examinations, categorizes point distributions as clustered, uniform, or random. The study employs a Chi-square test to determine the significance of associations, focusing on the distribution of land use types (mixed, residence, commerce) within four areas: MCC, MC, SC, and AGJ. This research utilizes SPSS software to investigate the relationship between geographical locations and functional categories, classifying functions into three primary groups: Mixed, Residential, and Commercial. Commercial functions include entities such as banks and retail stores, residential functions consist of apartments and standalone homes, while mixed functions encompass that blends multiple uses into one space where those functions are to some degree physically and functionally integrated.

3. Result

Urban areas have unique land uses and development paradigms. In the study area, Addis Ababa, the land use type is usually a mixed of residential with commercial-type. The general scenario of land use planning is adapted as the mixed development. However, such land use development is taking place with shallow legal and policy background that frame the plan. Hence, under this sub section, the results concerning challenges of the mixed land use development, distribution of functions mainly residential, commercial and mixed which are not consistent and mutually supportive each other, resulting disturbances in the land use planning.

In [Figure 4](#), we illustrate the distribution of functions across four study sites (MCC, MC, SC, and AGJ) during a 2020 site survey in Bole and Kirkos sub-city. We measured these functions in terms of households. SC had a higher residential use compared to the other study areas, with residential functions being the most prevalent across all study sites. On the contrary, commercial use was the least common function when compared to mixed-use ([Table 4](#)). Specifically, SC had approximately 79% residential use, whereas AGJ had precisely 62%. AGJ also had a higher residential usage than MC, with percentages of about 62% and 56%, respectively. In the context of mixed use, MCC accounted for approximately 46%, while SC had roughly 36%. SC had a greater proportion of mixed use compared to AGJ, with percentages of around 36% and 20%, respectively.

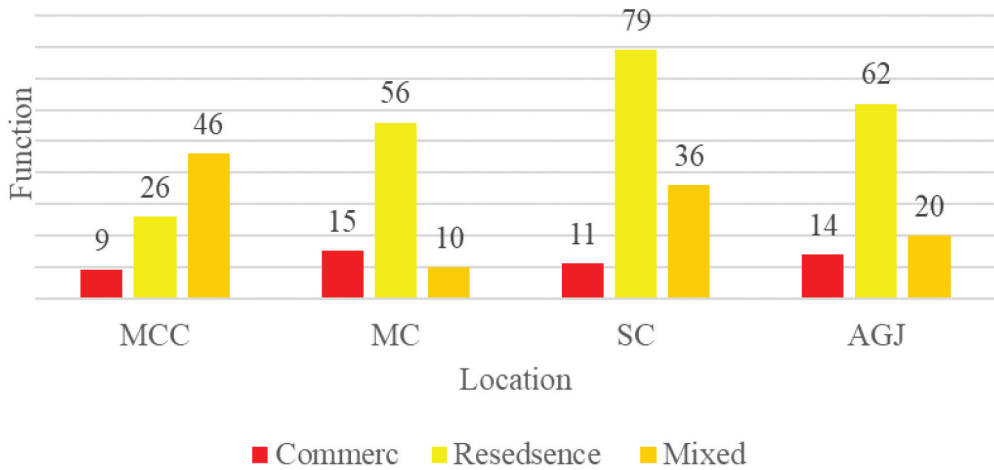


Figure 4. The distribution of commerce, residence and mixed functions on the four study site (MCC, MC, SC and AGJ) Source: Author, Site survey, 2020.

Table 4. Chi-square statistical test result of location and functional distribution.

Study site	Count	Commerce	Residence	Mixed	Total
MCC	Observed	9	26	46	81
	Expected	10	47	24	81
	χ^2	0.2	9.4	21.2	30.8
MC	Observed	15	56	10	81
	Expected	10	47	24	81
	χ^2	2.1	1.7	7.9	11.7
SC	Observed	11	79	36	126
	Expected	16	73	37	126
	χ^2	1.6	0.5	0.0	2.1
ATJ	Observed	14	62	20	96
	Expected	12	56	28	96
	χ^2	0.3	0.7	2.3	3.2
Statistical Chi square				χ^2	47.763
Degree of freedom (df) = (r-1) *(c-1)				df	6.000
Statistical tables Chi square value				χ^2	12.592

Source: study site survey data, 2020.

Chi-square statistics were employed to explore the relationship between location and the distribution of functions (Mixed, Commerce, and Residence). At the 5% significance level, our analysis reveals a noteworthy connection between location and the current function at the specified site ($\chi^2 = 47.763$, $df = 6$, $p = 0.001$). Notably, the statistical chi-square value greatly exceeds the tabulated critical value (i.e. $47.763 > 12.592$), providing substantial evidence to reject the null hypothesis (H_0). Consequently, we cannot accept the null hypothesis, affirming a significant link between location and function. Hence, we find support for H_1 .

Given that our p-value is less than 0.05, we can confidently conclude that the observed pattern of selected sites does not significantly differ from the expected distribution under the null hypothesis of Complete Spatial Randomness (CSR). To further assess the magnitude of these differences, we conducted an effect size analysis, which revealed a small to medium effect size (0.353). This outcome

suggests that location does indeed have a discernible impact on the distribution of functions.

The paper compares propose that, in a specific metropolitan region in Addis Ababa, location has more weight over functional distribution than the Mixed land use theoretical planning and development framework, as well as its related clear standards and laws. The study aims to test and appraise the practical use of mixed land use planning in accordance with theoretical frameworks. Furthermore, the study examines the chosen area’s planning and development rules, as well as regulatory mechanisms. In contrast to the null hypothesis suggesting a negative correlation between location and functional distribution, the results reveal that pure residential functions exhibit a more scattered distribution when compared to mixed and commercial types of use, as depicted in Figure 4. The analysis, employing Pearson’s correlation coefficient, shows a weak negative correlation between location and functional distribution ($r = 0.123$). Moreover, there is no significant association between function and location ($r = -0.516$). These findings imply that functions are distributed in a seemingly arbitrary and unrelated manner. Conversely, functional distribution appears to be relatively unaffected by the specific location.

The Figure 4–7 displayed below are the results of Quadrat Analysis generated using ARC-GIS software. These outputs include point pattern density (considered houses as points), the distribution of houses observed within the designated quadrats, and the Poisson distribution.

In Table 3 above, we present the house density data for the study area, including MCC, MC, SC, and AGJ, gathered during the 2020 site survey in Bole and Kirkos sub-cities. The units of measurement are houses per hectare. Overall, the secondary corridor exhibited the highest house density compared to the main corridor, while the Main City Center had a higher density than the peripheral areas. Specifically, SC boasted a density of approximately 41 houses per hectare, in contrast to MC’s 16 houses per hectare. Furthermore, MCC showed a higher density than AGJ, with figures of approximately 27.2 and 19.2 houses per hectare, respectively.

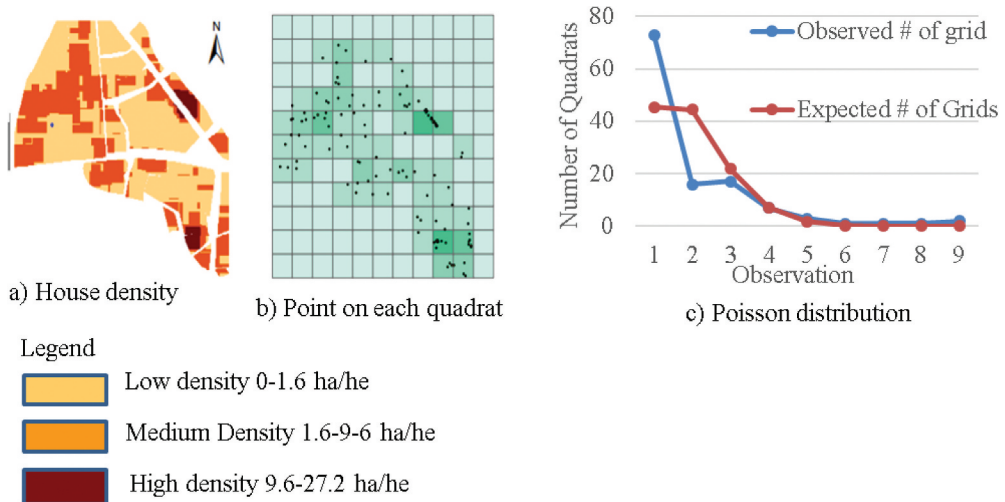


Figure 5. Main City center analysis Source: study site survey data, 2020.

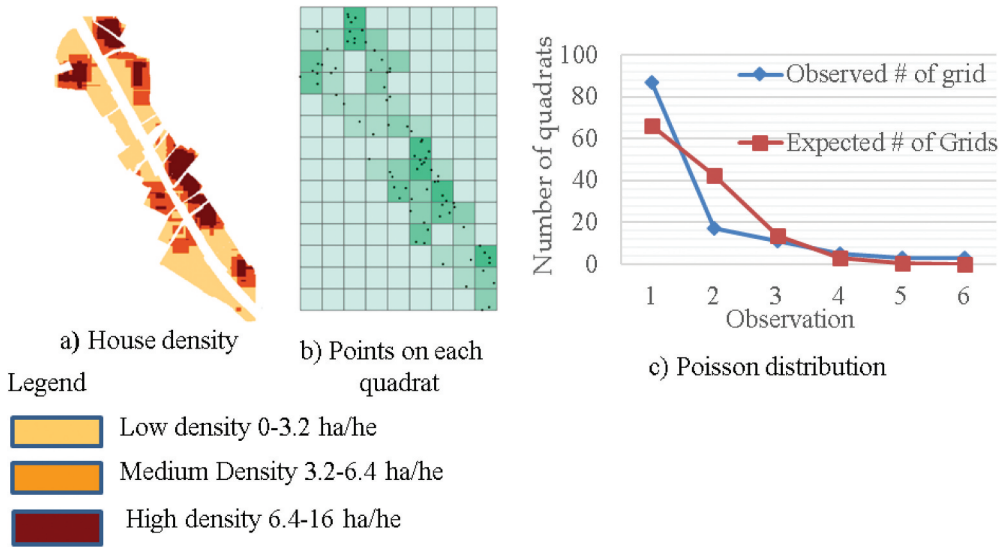


Figure 6. Main Corridor Quadrat analysis Source: study site survey data, 2020.

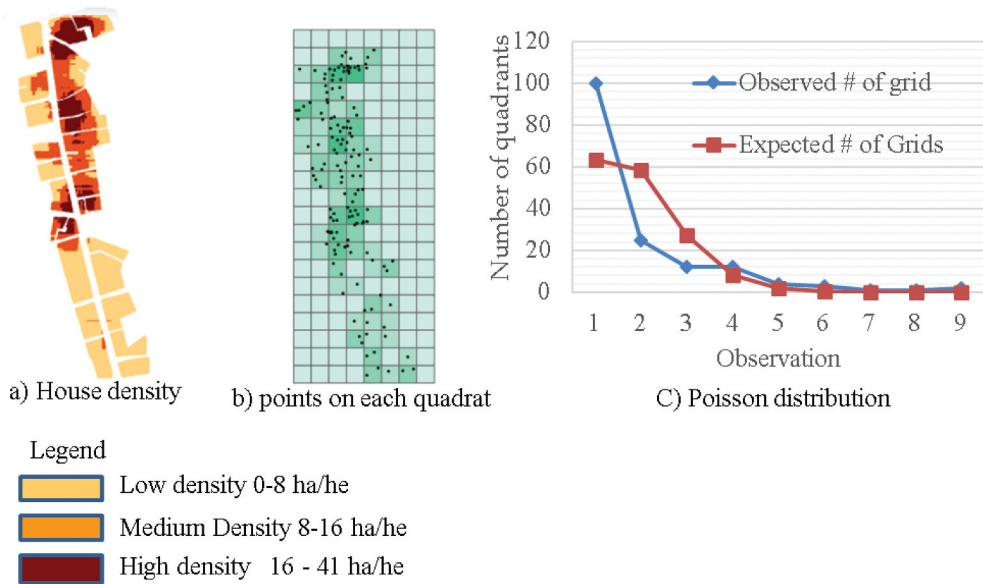


Figure 7. Secondary corridor Quadrat analysis Source: study site survey data, 2020.

4. Discussion

The study of the spatial distribution of urban land use in Addis Ababa, notably in the sub-cities of Bole and Kirkos, gives light on the actual application of mixed land use planning. This research departs from theoretical frameworks that argue for strong legal and policy foundations in mixed land use planning (Butler, 2006; Rudolf et al., 2018), revealing a scenario in which mixed land use development occurs with inadequate

support in these areas. The quantitative findings highlight the difficulties in achieving a consistent and mutually beneficial distribution of functions, particularly in the prevalence of residential land use across all study sites, with the Secondary Corridor (SC) exhibiting the highest residential use at approximately 79 % (see [Figure 4](#)).

The results of chi-square analysis show a substantial relationship between location and land use distribution, which is consistent with previous studies stressing spatial dependency in land use patterns (Briassoulis, 2020; Credit, 2019; Jun, 2017). The rejection of the null hypothesis of Complete Spatial Randomness (CSR) and the modest to medium impact size add to the evidence that spatial determinants influence observed land use distribution. Furthermore, Pearson's correlation coefficient indicates a modest negative association between location and functional distribution, highlighting the subtle and complicated nature of spatial correlations in urban land use (Duncan et al., 2012; Ganguly et al., 2017; Generalova et al., 2018).

The use of GIS-based Quadrat Analysis provides a geographical viewpoint, revealing different home densities across research sites. The higher density in the Secondary Corridor (SC) highlights the spatial variability of land use patterns within the city, providing useful insights for urban planners and policymakers while underlining the importance of context-specific land use planning techniques.

The study's goal was to assess the practical implementation of mixed land use planning while taking both theoretical frameworks and planning principles into account. The findings indicated significant geographical distribution elements that support the goals of mixed-use planning and refute the CSR hypothesis. Pearson's correlation coefficient revealed a somewhat negative relationship between location and functional distribution. Furthermore, the Quadrat Analysis graphically verified these findings, providing subtle insights into the complex interaction between location and land use distribution in the context of urban planning (see [Figure 5–8](#)).

The analysis reveals crucial links in the geographical distribution of urban land use in the sub-cities of Bole and Kirkos, highlights the non-random nature of urban land use distribution, which is corroborated by chi-square analysis, which shows a significant association between location and land use distribution. The correlation research, on the other hand, reveals a minor negative association between location and functional distribution, implying the influence of factors other than geography. The Quadrat Analysis graphically highlights non-random spatial patterns, allowing for a more complete comprehension of the subtle processes affecting land use in the selected sub-cities (Mix & Pafka, 2017; Summary, 1996).

Statistical calculations show that the study has dual relevance. The Chi-square analysis shows a strong relationship between location and distribution of land use, however the correlation study finds only minor correlations, showing that factors other than location have a larger influence. These modest insights add to a full understanding of the intricate mechanisms that determine the spatial distribution of the study area of urban land use, both confirming and deviating from previously predicted hypothesis.

The study's significance is defined by theoretical frameworks and prior research, which examine the spatial distribution of urban land use in the sub-cities of Bole and Kirkos. Chi-square analysis backs up well-known urban planning theories (Carpio-Pinedo et al., 2021; Shen & Sun, 2020), arguing for the effectiveness of mixed-use design and rejecting the null hypothesis. The correlation analysis, which

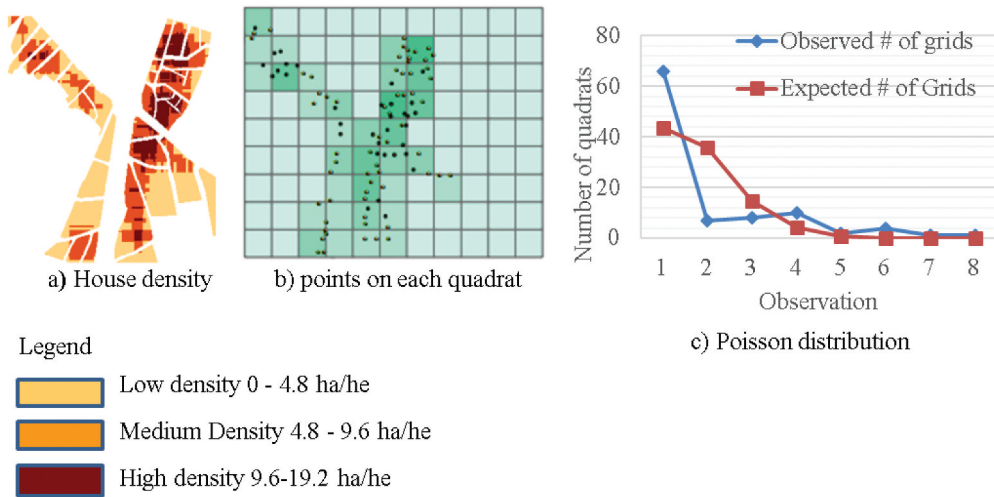


Figure 8. Around Goru Junction Quadrat Analysis Source: study site survey data, 2020.

found weak links between location and functional distribution, supports the theoretical premise that factors other than geographical location has a considerable influence on land use patterns. This intricacy, inherent in urban planning theories, highlights the multifarious nature of the identified linkages in the selected sub-cities.

The study on the practical application of mixed land use planning in the sub-cities of Bole and Kirkos concludes by highlighting a substantial relationship between location and land use distribution, hence validating the efficacy of mixed Land use planning as advocated in urban planning theories. The sophisticated theoretical argument that local contextual factors greatly determine land use patterns is supported by the nuanced findings of the correlation analysis, which show the influence factors other than geographical location. These findings highlight the complicated interplay between theoretical frameworks and observable realities in urban planning, revealing important insights into the complexity of achieving balanced and purposeful land use in dynamic urban environments.

The exploratory study admits limitations that limit the breadth and usefulness of its findings. The scarcity of empirical studies on civic mixed land use geographical distribution may limit the depth and generalizability of the analysis. Capturing variances across diverse civic environments is difficult, and this has an impact on the soundness of given solutions. The depth of stakeholder engagement may vary, influencing the findings' significance. The study's concentration on specific Addis Ababa sub-cities may limit its applicability to other places. Long-term trends may not have been fully captured throughout the study period of 2002 to 2017. Implementation challenges in mixed land use planning may limit insights into the real effectiveness of these programs. In geographical analysis, hypotheses may oversimplify complex civic dynamics. The single-megacity emphasis and limited legal and policy backdrop may limit the broader applicability of recommended strategies. Future research could broaden understanding by looking beyond regional boundaries, doing a more nuanced examination of socio-economic, creative, and literal effects, and applying qualitative methodologies for a more complete picture.

Future study could expand our understanding of urban land use trends by looking beyond geographical concerns. A more comprehensive assessment of socioeconomic, cultural, and historical impacts could provide deeper insights into the intricacies of the urban landscape. Longitudinal research documenting changes over time would add to a more dynamic understanding of how urban landscapes evolve. In terms of suggestions, comparative evaluations across cities or regions with varying planning policies and socioeconomic conditions could give information on the influence of different planning approaches on land use distribution. Furthermore, future research might apply qualitative approaches to investigate residents' and companies' perspectives and preferences, providing a more comprehensive understanding of the acceptance and success of mixed-use design concepts. In order to further this research, the use of qualitative approaches could provide deeper insights into the decision-making processes that influence land usage. Collaborative research involving urban planners, politicians, and community stakeholders could improve practical applications in urban planning and policy, creating a more complete perspective. Furthermore, the inclusion of variables linked to community participation, infrastructure development, and accessibility in future studies may provide a more holistic understanding of the complex dynamics forming urban environments.

Extending the conceptual scope to include a broader range of land use types or investigating the impact of land use patterns on environmental sustainability could be considered, resulting in a more comprehensive understanding of the interconnectedness of land use planning, social dynamics, and environmental considerations. Finally, future research might look into advanced spatial analysis approaches like geospatial modeling or machine learning algorithms to improve the precision and depth of analyses about the geographical linkages between land use and numerous influencing factors. These guidelines are intended to guide future research efforts, ensuring a more thorough examination of the intricacies inherent in urban land use processes.

The findings of this study have important consequences for individuals, management, and organizations working in urban areas. Individually, households and enterprises stand to benefit from a better awareness of the geographical distribution of functions, allowing them to make better decisions.

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Author contribution statement

Girmachew Tariku: Conceived, designed and performed the research; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Dr Liku Workalemahu: Conceived, developed the research; Examined and interpreted the data; Contributed *reagents*, materials, analysis tools or data; Wrote the paper.

Dr Dagnachew Adugna: Conceived and designed the research; Analyzed and interpreted the data; Wrote the paper.

Ethical approval and informed consent

This study paper was ethically approved by the Addis Ababa University, Ethiopia Institute of Architecture, Building Construction and City Development. The Ethical Review Board with a member of five committees named as Dr. Mintesnot Woldeamanuel (Chair), Dr. Fisseha Wegayehu (Member), Dr. Dipl-Ing Berhanu Woldetensae (Member), Dr Dagnachew Adugna (Member), Dr Liku Workalemahu (Member). For this study, a written informed consent was obtained from Thesis Proposal Evaluation Committee before collecting a primary data (Survey Questionnaire). The Ethical Approval Letter include conclusion, recommendation and evaluation result of the Ph.D. Thesis proposal.

After that the university write cooperation letter for Bole, Kir-Kos sub city, and for other institutions that relevant for study. Accordingly, confidential letter was written and communicated with cellphone and email with each individual respondents and offices. After Informed and obtained consent for all subject, individuals and institutions involved in this study then, I started to collect every relevant data.

Data availability statement

The collected data was filled in hard and soft copy, included, referenced in article. And also the data presented in this study are available in corresponding author and can provide if, the publisher required any time.

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Appendix A

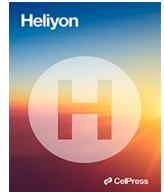
Table A1. Demographic characteristics of the household sample.

	MCC		MC		SC		AGJ	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Gender								
Male	43	53.1	43	53.1	63	49.2	51	52.1
Female	38	46.9	38	46.9	65	50.8	45	46.9
Total	81	100	81	100	128	100	96	100
Age of respondents								
18–27	21	25.9	43	53.1	39	30.5	30	31.3
28–37	33	40.7	25	30.9	45	35.2	40	41.7
38–47	14	17.3	6	7.4	22	17.2	16	16.7
48–57	8	9.9	1	1.2	16	12.5	6	6.3
58–67	3	3.7	1	1.2	3	2.3	2	2.1
68–77	2	2.5	0	0	1	0.8	2	2.1
Missing System	0	0	5	6.2	2	1.6	0	0
Total	81	100	81	100	128	100	96	100
Education								
Illiterate	1	1.2	2	2.5	4	3.1	2	2.1
Read and write	2	2.5	4	4.9	6	4.7	1	1
Grade 1 up to 8	9	11.1	9	11.1	11	8.6	9	9.4
Grade 9 up to 12	13	16	7	8.6	12	9.4	14	14.6
Diploma	32	39.5	32	39.5	54	42.2	37	38.5
Degree and above	24	29.6	26	32.1	41	32	33	34.4
Missing System	0	0	1	1.2	0	0	0	0
Total	81	100	81	100	128	100	96	100
Job Status								
Business	5	6.2	16	19.8	20	15.6	29	30.2
Engineering (graphics, Artist)	5	6.2	1	1.2	6	4.7	3	4.1
Social Science (economist, accountant)	3	3.7	3	3.7	12	9.4	12	12.4
Secretarial, Social Work	6	7.4	3	3.7	7	5.5	18	18.8
Others (Driver, teachers)	12	14.7	2	2.5	7	5.4	13	13.6
Nursing, public health, Doctor, Pharmacists, Public/Health Admin	0	0	1	1.2	9	7	0	0
Students	12	14.8	8	9.9	5	3.9	4	4.2
No job	0	0	4	4.9	13	10.2	0	0
No response	38	46.9	43	53.1	44	34.4	16	16.7
Total	81	100	81	100	128	100	96	100

(Continued)

Table A1. (Continued).

	MCC			MC			SC			AGJ
House hold size										
Single	4	4.9	7	8.6	6	4.7	12	12.5		
Paired	16	19.8	8	9.9	13	10.2	7	7.3		
Three	16	19.8	18	22.2	21	16.4	23	24		
Four	10	12.3	19	23.5	24	18.8	15	15.6		
Five	6	7.4	21	25.9	27	21.1	13	13.5		
Six	5	6.2	6	7.4	21	16.4	15	15.6		
Seven	4	4.9	1	1.2	8	6.3	7	7.3		
Eight and above	4	4.9	1	1.2	8	6.3	4	4.2		
No response	16	19.8	0	0	0	0	0	0		
Total	81	100	81	100	128	100	96	100		
House ownership										
Government	26	32.1	4	4.9	10	7.8	0	0		
Private	16	19.8	16	19.8	42	32.8	8	8.3		
Kebele/Public	24	29.6	25	30.9	39	30.5	52	54.2		
Rental House	14	17.3	36	44.4	36	28.1	33	34.4		
Others	1	1.2	0	0	1	0.8	3	3.1		
Total	81	100	81	100	127	100	96	100		



Research article

Impact assessment of mixed land-use planning in Ethiopia: The case of Addis Ababa

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ABSTRACT

Urbanisation presents complex challenges that necessitate sustainable solutions for equitable resource distribution, environmental protection and economic growth. Mixed land-use planning (MLUP) offers a promising approach by integrating residential, commercial and recreational spaces, thereby enhancing urban resilience and inclusivity. However, its comprehensive impact on Addis Ababa remains underexplored, highlighting a notable research gap. This study aims to address this gap by examining the socio-economic, physical and environmental effects of MLUP across key Addis Ababa zones using a mixed-methods approach. Involving 384 households, 40 urban planning specialists and 14 key informants, including higher officials and diverse local community members from the Kir-kos and Bole sub-cities, the research used various sampling methods and data collected from 2002 to 2017 through surveys, interviews and observations. The analysis assesses MLUP's role in promoting economic growth, social cohesion, efficient land use and environmental sustainability. Findings reveal considerable variations in MLUP's impact on transportation and access to amenities, underscoring the need for context-specific planning. Insights from planners and community members highlight the benefits and challenges of MLUP and provide recommendations for improved urban planning practices that support sustainable urban environments.

1. Introduction

Urban areas worldwide are facing unprecedented planning challenges driven by rapid urbanisation and the need for sustainable development. These challenges include managing population growth, ensuring equitable access to resources, mitigating environmental impacts and fostering economic development. According to Ref. [1], urban mixed land-use planning (MLUP) emerged as a response to the challenges brought about by the Industrial Revolution (IR) [2,3]. The IR raised new and complex urban issues that required a fresh approach to planning and development. MLUP has been recognised as a strategic approach to address these urban challenges by integrating diverse functions within urban spaces. This approach promotes resilience and inclusivity in urban areas, contributing to more sustainable and liveable cities [4,5]. Among these challenges, MLUP emerges as a strategic approach to fostering more resilient and inclusive urban spaces. By integrating residential, commercial and recreational activities within the same

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neighbourhood [6], MLUP stimulates local economies [7], promotes social cohesion [8] and cultural exchanges [9], encourages entrepreneurship and enhances job opportunities [10,11]. Mixed-use developments attract diverse residents and businesses, contributing to the creation of inclusive and resilient urban economies [12]. Mixed land-use development (MUD) is a contemporary urban planning strategy designed to optimise urban space by integrating diverse land uses within the same area. This approach aims to foster vibrant, sustainable and economically dynamic urban environments by promoting the coexistence of residential, commercial, recreational and sometimes industrial uses within a single neighbourhood [6].

Ethiopia, with its capital Addis Ababa, has experienced rapid urban economic growth [13] and spatial development [14], providing a unique context for exploring the impacts of MLUP. Addis Ababa's urban landscape is rapidly evolving [15], necessitating careful study of the influence of MLUP. The city's increasing urbanisation, industrialisation and population growth pose significant challenges to sustainable development [16], making it an ideal case study for assessing the impacts of MLUP [17]. In the context of Addis Ababa, Ethiopia's rapidly growing capital, effective land-use management strategies are essential to address significant urbanisation

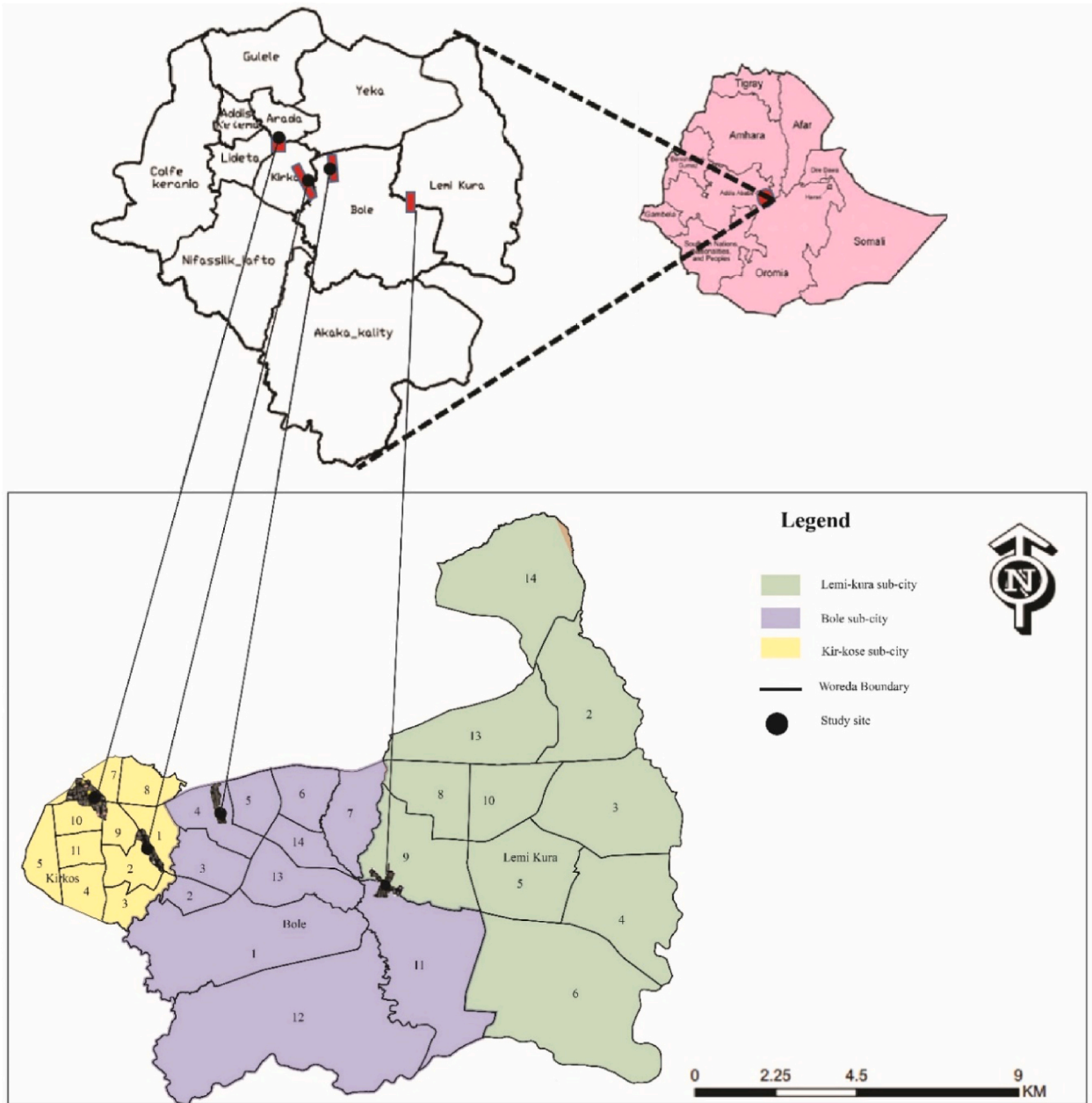


Fig. 1. Map of the study areas in Kir-kos and Bole Sub-cities. Source: Structural Plan Manual (revised version), May 2012, Addis Ababa.

pressures. MLUP is particularly relevant because it can mitigate the challenges of rapid population growth and urban sprawl.

Despite its acknowledged benefits, the comprehensive impact of MLUP in Addis Ababa remains underexplored, with only a few studies assessing its socio-economic and environmental implications. A previous study [7] conducted a detailed comparative examination of the growth and geographical patterns of urban development, demonstrating that the urbanisation processes in Addis Ababa were consistent. However, according to Koroso et al., Addis Ababa's urbanisation processes were steady but inefficient [18]. This study aims to fill this gap by providing a detailed analysis of MLUP in specific contexts and a holistic view of its impacts on socio-economic, physical and environmental outcomes in different zones of Addis Ababa (Fig. 1). These impacts span four key zones: Main City Center (MCC), Main Corridor (MC), Secondary Corridor (SC) and Around Goru Junction (AGJ) (Fig. 2). In addition, this study aims to assess the impacts of MLUP in Addis Ababa on selected study areas, focusing on socio-economic, physical and environmental outcomes. By analysing the experiences of these areas, this study offers valuable insights into the effective implementation of MLUP in rapidly urbanising cities. Employing a mixed-methods approach, this study provides essential data for urban planning stakeholders, including local governments, planners, policymakers, developers and community groups.

2. Methodology

This study assesses the impacts of MLUP on social, economic, physical and environmental (SEPE) dimensions in Addis Ababa, providing a comprehensive understanding of its relevance and effectiveness in urban contexts. Socioeconomically, MLUP promotes economic growth by stimulating local economies, encouraging entrepreneurship and enhancing job opportunities. Socially, it fosters community cohesion and cultural exchanges by attracting a diverse range of residents and businesses [8,10,11]. Physically, compact mixed-use neighbourhoods reduce urban sprawl, preserve green spaces and promote efficient land use. These neighbourhoods enhance walkability, reduce reliance on private vehicles and mitigate traffic congestion and air pollution [19,20]. Environmentally, MLUP integrates green.

By immersing oneself in these locales and using detailed selective criteria, one can identify the study site (Table 1). This study evaluates the magnitude of their impact, assesses the effectiveness of applied MLUP theories and explains the reasons for any observed outcomes.

The study population comprises residents, urban planners and local community members from the study areas in Addis Ababa. A

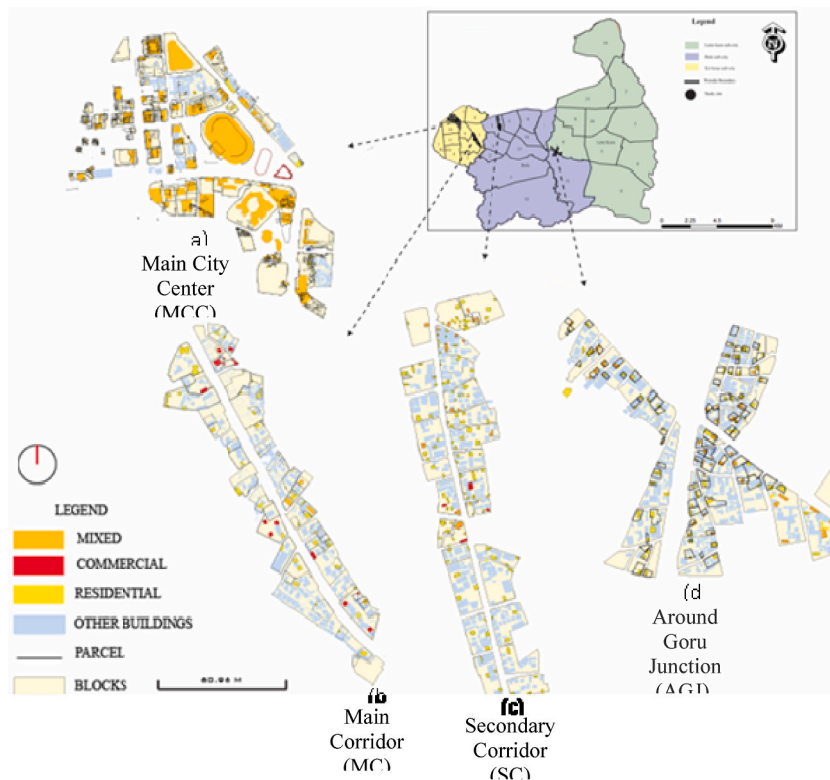


Fig. 2. Map showing the locations of the study areas (a) **Main City Center**: covers the Legehare study area, which comprises Woreda 6, 7, 9, and 10, (b) **Main Corridor**: focuses on Woreda 1, 2, and 9, emphasising the Main Corridor (MC) or Africa Street from Dembel to the Wollo-Sefer roundabout, (c) **Sub corridor**: concentrates on Woreda 4, also known as the 22 roundabout, to the cross junction near the new stadium, which represents the Sub-Arterial Street (SAS). Finally, (d) **Around Gour Junction**: focuses on Woreda 11, also known locally as the Goru crossroads. Source: Adapted from Jinollo, G. T., 2024.

Table 1
Details of the selective criteria for each study area (MCC, MC, SC and AGJ).

Characteristics	MCC	MC	SC	AGJ
Distance from the city center (Arada Georges) to study area (km)	3	5	7	10
Social characteristics	Modern lifestyle with reduced local and traditional lifestyle	Modern streetscapes and high corridor development	Moderate street and medium corridor development	Predominantly local and traditional lifestyle
Economic characteristics	Highest number of business transactions in sets of international offices	High-density, vibrant economy	Low-rise houses in a more vibrant economy	Link between suburban and transitional economies
Availability of public service	International and national institutions	International and national institutions	Basic goods and services along sub-arterial streets	Local and more traditional services and goods
Transportation accessibility	High: LRT, buses, taxis and private automobiles are available	Moderate: buses, taxis and private automobiles are available	Moderate: buses, taxis and private automobiles are available	Moderate: buses, taxis and private automobiles are available
Land valuation	Highest	Higher	High	Moderate
Urban Area, Corridors and Junction Development Levels	Highest	Higher	High	Moderate
Settlement types	Very important functions available, such as the international organisation set	Main corridor: connects Bole International Airport and Main City Center	Sub-corridor: highly active due to shops	Junction with stations, connects to expressway
Urban settlement inception period	Established in 1889 [15]	1948	1960	1970
Corridor development level	Highest	Major	Moderate	High

Source: Primary and secondary data from a field survey, 2020.

total of 384 household participants, 40 urban planning specialists, 14 key informants among higher urban planning officials and decision makers and a diverse group of local community members were selected from the Kir-kos and Bole sub-cities. The sample was selected using a combination of non-probability and probability sampling methods to ensure representativeness and diversity. Purposive snowball sampling was used to select urban planners, and stratified random sampling was employed for residents. Participants included individuals of various ages, genders and socio-economic backgrounds, reflecting the demographic diversity of Addis Ababa (see Appendix C, D and E in supplementary document).

Data were collected using surveys, interviews and observation guides. Surveys included both closed-ended questions using a Likert scale and open-ended questions for qualitative insights. Interviews were conducted with urban planners, questioners for Residence and Local community, and key informants (see Appendix – F (Tables S17–S19), G, and H in the supplementary material). And observations focused on the socio-economic, physical and environmental aspects of the study areas. The data collection process involved multiple stages, including pilot studies to refine instruments and protocols, researcher training to ensure consistency and systematic data collection through random sampling in designated zones. The data collection period spanned from 2002 to 2017, allowing for a comprehensive temporal analysis.

The research topic exemplifies a methodologically rigorous approach to testing research assumptions. Several dimensions were critically analysed, including data shape and distribution, sample independence, variance homogeneity, data linearity, outlier presence and multicollinearity. These assumptions were rigorously tested using appropriate statistical approaches. The selected tests, which include the Shapiro–Wilk test for data distribution, Levene’s test for variance homogeneity, Mahalanobis distance for outlier identification and Cronbach’s alpha for detecting multicollinearity, demonstrate the study’s methodological soundness [21] (see

Table 2
Secondary sources, data types and collected information.

Document	Types of data	Information
Central Statistical Agency of Ethiopia (CSAE)	Quantitative	Demographic characteristics of the study area
Urban Plan Preparation and Implementation Strategy (in hard copy only)	Qualitative	Land-use planning and development approach in Addis Ababa
Urban planning declaration in Ethiopia: https://lawethiopia.com/images/federal_proclamation/proclamations_by_number/574.pdf	Qualitative	Regulation and policy in urban areas
Urban Development Policy: http://196.188.93.162/c/document_library/get_file?uuid=65a180a2-7aca-4bde-bb7d-377be1459acf&groupId=10136	Qualitative	Development strategy in different urban areas
Urban Planning Proclamation: https://lawethiopia.com/images/federal_proclamation/proclamations_by_number/574.pdf	Qualitative	Land-use classification and location
Structure Plan Preparation and Implementation Manual, ROAMP 2002 (in hard copy only)	Qualitative	Urban land-use classification and service assignment
Structure Plan Preparation and Implementation Manual AAPPCCO 2017–2027 (in hard copy only)	Qualitative	Urban land-use classification and service assignment

Appendix B, Tables S10–S13 in the supplementary material). The use of non-parametric Freedman ANOVA tests, guided by the Shapiro–Wilk test results and subsequent post hoc analysis with Kendall’s coefficient of concordance (W), added depth to the investigation of effect size and significance, as evidenced by the detailed results presented (see Appendix A, Tables S1–S9 in supplementary document) in the supplementary material.

Qualitative data, comprising both secondary source (Table 2) and primary data, were coded and analysed using thematic analysis to identify patterns and themes in the textual data, providing deep insights into stakeholder perceptions and contextual factors. Meanwhile, quantitative data were analysed using descriptive and inferential statistics, with software tools such as SPSS v20 to facilitate statistical analysis, including the calculation of means, variances and significance tests. All participants were informed about the study’s goals, methods and rights and provided signed informed consent. Participants’ confidentiality and anonymity were protected through measures such as the use of coded IDs and secure data storage. The institutional review boards and ethics committees approved the study.

The Institute of Architecture, Building Construction and City Development (EiABC) of Addis Ababa University accepted the study protocol. Written informed consent was obtained from the Thesis Proposal Evaluation Committee before data collection. The validity of the research was ensured through triangulation using multiple data sources and methods. The inclusion of diverse participant perspectives also contributed to validity. Consistent data collection processes and the use of standardised instruments helped ensure reliability. Pre-testing of tools and inter-rater reliability checks were conducted to maintain consistency.

Some challenges encountered included potential biases in self-reported data and logistical difficulties in reaching all selected zones. These problems were mitigated through careful planning and robust sampling methods. Although these limitations may have affected the generalizability of the findings, they did not undermine the overall validity and reliability of the study.

3. Results

This study provides a comprehensive examination of the impacts of MLUP on SEPE dimensions in selected study areas in Addis Ababa (see Appendix I, Table S27 in the supplementary material). This section begins by presenting results that incorporate planner perspectives through Likert scale responses and evaluation questions (EQs), highlighting both consensus and discrepancies in MLUP effectiveness and their implications for urban planning. The study further includes observations from residents and the local community, along with statistical analyses that assess various metrics such as travel distance, transportation patterns, modes of transport and challenges stemming from misconceptions about MUD. After meticulously analysing these factors, key informants explored the elements driving the effects of MUD on SEPE facets in the selected study areas. Ultimately, this research aims to address significant challenges and understand the root causes of the impacts of the MUD dilemma on SEPE dimensions, offering valuable insights for policy formulation and urban development strategies.

3.1. Planners’ perspectives

Assessing evaluation questions (EQ) for social, economic, physical, and environmental development is critical for understanding planners’ perspectives. Normality testing using SPSS enhances the reliability and validity of the results, allowing for precise analysis (see Appendix I, Tables S20–S26 in the supplementary document).

Planners expressed their perspectives on the significance of the aforementioned factors using a Likert scale to indicate their level of agreement or disagreement. Consequently, they shared their observations and findings regarding the outcomes they encountered during the evaluation process.

The following section presents a set of evaluation queries (EQ) covering various aspects of SEPE development (see Tables 3–6).

The items with the highest consensus and strong agreement predominantly focused on the notion that the primary objective of MLUP was to influence the design of planning tools. In addition, there is a widely held belief that MUD represents the dominant form of urban development within the framework of Addis Ababa city.

The most unanimous agreement is that the introduction of MUD is widely accepted socially.

The primary point of contention revolves around the notion that MUD has not effectively contributed to the development of a thriving and prosperous economy in the study areas.

The point with the most consensus is that urban MUD in the selected study area lacks clear environmental regulations and negatively affects the environment.

Table 3
Percentage of MLUP impacts on the physical development of the study site.

Physical development EQ	SD	D	UN	A	SA
The objectives of MLUP were to frame the planning instruments.	7.5 %	5.0 %	17.5 %	50.0 %	20.0 %
MLUP is more important than any other planning approach in the Addis Ababa context.	7.5 %	10.0 %	30.0 %	27.5 %	25.0 %
MLUP improperly allocates the best function at a given point.	2.5 %	17.5 %	22.5 %	40.0 %	17.5 %
MUD is most likely land-use management for the Addis Ababa city context.	5.0 %	12.5 %	20.0 %	22.5 %	40.0 %

Source: Primary data from a field survey conducted in 2020.

Table 4
Percentage of the frequency of social development at the study site.

Social development EQ	SD	D	UN	A	SA
MUD has been successful in current social development.	10.0 %	30.0 %	22.5 %	30.0 %	7.5 %
MUD favours certain groups of city dwellers.	12.5 %	12.5 %	25.0 %	35.0 %	15.0 %
MUD maximises social development outcomes at the minimum cost.	7.5 %	20.0 %	30.0 %	22.5 %	20.0 %
MUD is highly dependent on and intertwined with the norms, values and cultures of a society.	12.5 %	15.0 %	27.5 %	30.0 %	15.0 %
Implementing MUD has a high degree of social acceptability.	5.0 %	17.5 %	25.0 %	40.0 %	12.5 %

Source: Primary data from a field survey conducted in 2020.

Table 5
Percentage of frequency of economic development in the study area.

Economic development EQ	SD	D	UN	A	SA
MUD has a negative effect on economic development.	17.5 %	32.5 %	22.5 %	20.0 %	10.0 %
MUD has created a vibrant and active economy in the study area.	17.5 %	35.0 %	20.0 %	22.5 %	5.0 %

Source: Primary data from a field survey conducted in 2020.

Table 6
Percentage of frequency of environmental development in the study areas.

Environmental development EQ	SD	D	UN	A	SA
Controlling the type of use in the study area is difficult.	10.0 %	20.0 %	12.5 %	45.0 %	12.5 %
Can we say that there is an unclear mixed-use environmental implementation regulation instrument?	0.0 %	15.0 %	17.5 %	35.0 %	32.5 %
MUD has a negative effect on the environment.	0.0 %	10.0 %	22.5 %	47.5 %	20.0 %
MUD has environmental inequality in the same and different generations.	0.0 %	17.5 %	32.5 %	19.5 %	20.0 %

Source: Primary data from a field survey conducted in 2020.

3.2. Residence and local community

In this section, we systematically gather input from both residents and the broader local community, encompassing customers, pedestrians and drivers. Employing a precisely designed set of assessment questions, we embark on a comprehensive examination of how MLUP influences socio-economic, physical and environmental development in the study area. These inquiries probe various dimensions, including the proximity and frequency of departing from residential areas, transportation modes, disruptive land utilisation, persistent challenges linked to urban mixed land use, the time required to access the study site, engaging activities and behaviours during visits, walking-related constraints and the impediments faced by drivers in terms of driving, halting, parking and shopping within the research zone.

3.2.1. Residences

Individuals who live in a specific area or locality, typically referred to those who have established permanent residence in a particular community.

As shown in Fig. 3, residents travelled a daily range of 2000–2500 m. Interestingly, MCC residents recorded the longest average distance, approximately 2500 m, followed closely by AGJ and SC residents, both accounting for 38.7 % of the total daily travel distance.

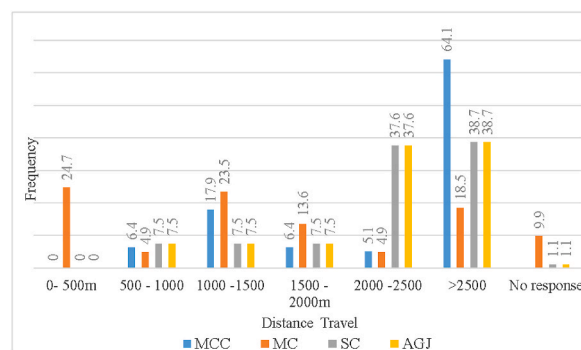


Fig. 3. Distance travelled by residents outside the neighbourhood (m/day).

As shown in Fig. 4, residents travel daily. Notably, AGJ and SC had the highest residence travel rates (both 71 %). MC and MCC residents had lower residence travel rates (43.6 % and 42.0 %, respectively).

Fig. 5 shows a noticeable trend in most selected study areas, where residents prefer using taxis as their primary mode of transportation over buses, private cars or walking. More specifically, in the MCC, SC and AGJ regions, a larger percentage of residents opt for taxis than in the MC region (65.6 % and 49.4 %, respectively).

Fig. 6 shows the factors that commonly cause disturbances among residents. Warehouses and nearby shops are significant disruptors. In the MCC area, approximately 37.2 % of residents reported disturbances related to bars. In SC and AGJ, shops and warehouses were identified as primary sources of disturbance (29 %), whereas bars contributed 18.3 % of residential disturbances.

Fig. 7 highlights the challenges faced by residents. These challenges notably include a lack of understanding of MUD and issues related to pollution. In MC, approximately 38.7 % of residents experience problems linked to incompatibility, whereas approximately 28.4 % grapple with the misinterpretation of MUD. Conversely, pollution emerges as the foremost challenge associated with MUD in MCC, affecting all the selected study areas, with issues of incompatibility also present across these regions.

3.2.2. Customers

individuals and entities that purchase goods or services from businesses or service providers. In the context of a community, customers may refer to those who engage in transactions with local businesses.

Fig. 8 shows that mixed-use areas and shopping destinations have a strong appeal to customers because of their proximity to work locations. Specifically, work-related areas in AGJ and shopping areas in SC attract a substantial customer base, accounting for 38 % of the total.

Percentage of residences used as means of transportation in the study area. Fig. 9 shows a noticeable trend in most of the selected study areas, where customers prefer using taxis as their primary mode of transportation over buses, private cars or walking. More specifically, in the SC and MC regions, a larger percentage of residents opt for taxis than in the AGJ region (93 %, 54 % and 32 %, respectively).

Fig. 10 illustrates the average time customers spend travelling from home to study sites, which predominantly falls within the 15- to 30-min range. Notably, in SC, 32 % of customers are within this time frame. Moreover, customers in AGJ and MCC spend more time travelling, with respective percentages of 24 % and 22 %.

3.2.3 Pedestrians: people who travel on foot, commonly on sidewalks or designated pedestrian areas, and do not rely on motorised transportation. Pedestrians play a crucial role in urban environments, contributing to the overall dynamics of public spaces.

Fig. 11 shows that, except in MC, the primary activity that attracts pedestrians is purchasing essential items, closely followed by work-related activities. In SC, 67 % of respondents buy basic necessities, whereas in MC, 39 % encounter issues related to work.

Fig. 12 shows a general trend: activities causing discomfort among pedestrians were more prevalent in SC than in AGJ and MCC. Notably, in SC, concerns about theft and crime account for 34 %, followed closely by crowdedness at 38 %.

3.2.3. Drivers

individuals who operate vehicles, such as cars, trucks, and motorcycles, for transportation.

Fig. 13 depicts the challenges encountered by drivers when parking cars off the main street on a permanent basis. Notably, in SC, security issues (30 %) prevail, followed by a significant lack of offset parking space (85 %). In contrast, in MCC, the figures are 19 % for security concerns and 46 % for insufficient offset parking space.

3.3. Key informants

To understand the factors driving the effects of MUD on socio-economic, physical and environmental facets, the research findings reveal significant insights across six overarching themes: physical integration and efficiency, social inclusion and cohesion, economic viability and sustainability, environmental resilience, policy and regulation dynamics and development transformation. Each of these themes plays a distinct role in the complex landscape of urban development. The analysis provides a comprehensive understanding of how these themes interplay, contributing uniquely to the evolution of urban spaces within various zones (see Tables 7–12).

Physical integration and efficiency involves integrating elements via infrastructure sharing, creating compact city spaces and promoting accessibility and efficiency. This concept optimises urban systems, enhances connectivity and minimises congestion, fostering harmonious coexistence and functional cityscapes.

Social inclusivity and cohesion prioritises equity, unity and collective efforts. It nurtures belonging, bonds and inclusive

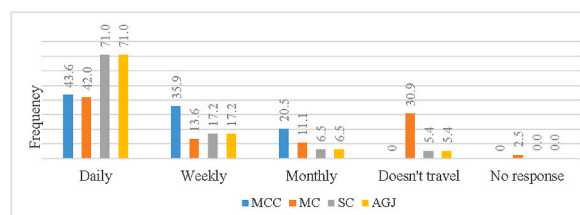


Fig. 4. Residence travel rate.

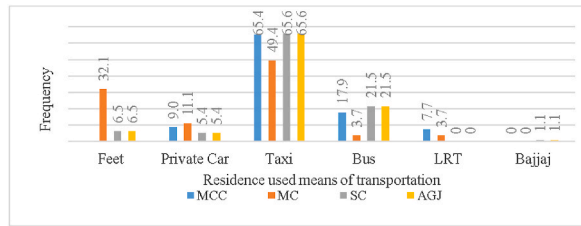


Fig. 5. Percentage of residences using transportation in the study area.

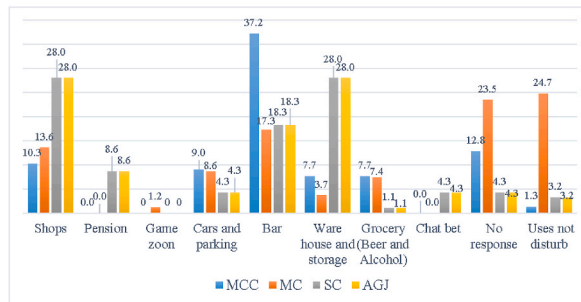


Fig. 6. Uses and activities that disturb you and your neighbourhood.

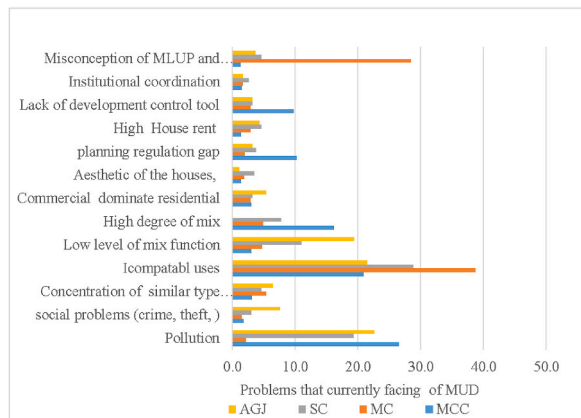


Fig. 7. Problems currently facing MUD.

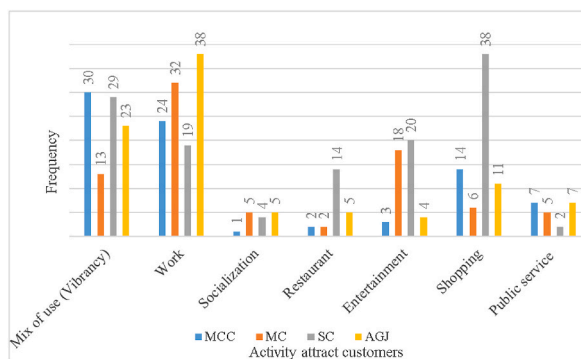


Fig. 8. Activities that attract customers to move to the study area.

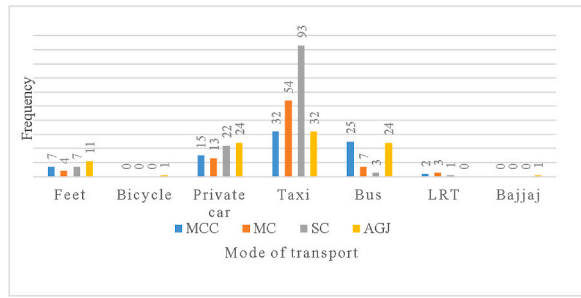


Fig. 9. Mode of transport customers used to reach the study areas.

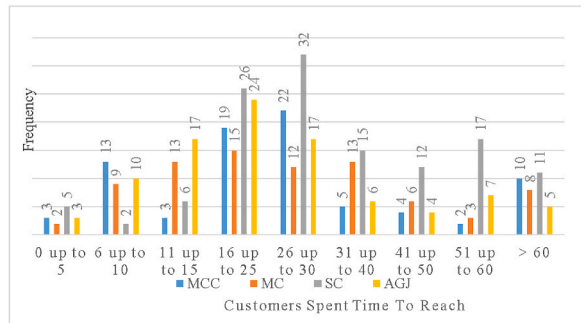


Fig. 10. Time spent by customers travelling from home to study sites (min).

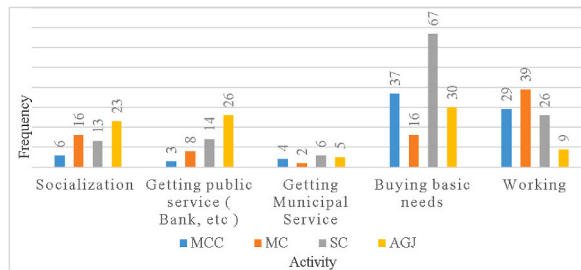


Fig. 11. Activities that attract pedestrians to the study area.

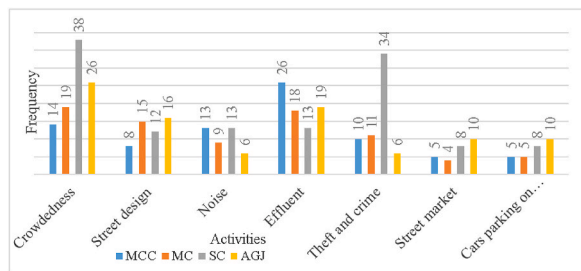


Fig. 12. Activities or uses that cause pedestrians to feel uneasy in MCC, MC, SC and SGJ.

communities.

Economic viability and sustainability (EVS) blend strategies, such as cross-subsidisation and enhancement of urban resilience and land values. EVS balances thriving urban economies with environmental stability, emphasising revenue, job creation and ecological harmony in cities.

Environmental resilience involves designing urban spaces to endure challenges while incorporating climate adaptability, carbon

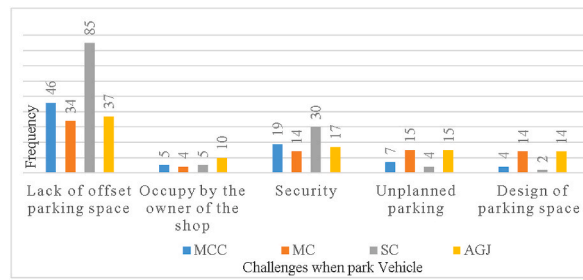


Fig. 13. Challenges encountered when parking a car at an offset or distance from a nearby street.

Table 7

Physical integration and efficiency.

Themes	Codes	Excerpts from the transcript
Physical integration and efficiency	Urban Design Infrastructure Sharing Vibrant Spaces Compact City	Emphasising urban vibrancy and active spaces while reducing extensive travel for services Sharing infrastructure and utilities, fostering diversity while maintaining harmony Creating an active and dynamic environment around the clock promotes urban vibrancy Introducing the concept of a compact city for effective urban growth management

Source: Primary data from a field survey conducted in 2020.

Table 8

Social inclusivity and cohesion.

Themes	Codes	Excerpts from the transcript
Social inclusivity and cohesion	Travel Reduction Mutual Support Inclusive Development Community Living Social Cohesion	Minimising the need for extensive commuting and reducing transportation expenses Traditional mutual support systems in the community, promoting inclusive development Addressing social inequality among diverse urban populations and fostering inclusivity Promoting social cohesion and community living in mixed-use neighbourhoods Emphasising the promotion of social cohesion and a sense of community through planning

Source: Primary data from a field survey conducted in 2020.

Table 9

Economic vibrancy and sustainability.

Themes	Codes	Excerpts from the Transcript
Economic viability and sustainability	Stakeholder Roles Cross-subsidisation Economically Active Areas Municipal Revenue Urban Economy	Roles of stakeholders such as landlords, clerks and craftspeople in mixed land-use development Necessity for cross-subsidisation and collaboration among diverse economic activities Creating economically active neighbourhoods with essential services and businesses Maximising municipal revenues through economic activities such as rent and taxes Enhancing urban economy and market dynamics through mixed land-use planning

Source: Primary data from a field survey conducted in 2020.

Table 10

Environmental resilience.

Themes	Codes	Excerpts from the transcript
Environmental Resilience	Land Values Land Suitability Environmentally friendly facilities Carbon Emissions Sustainable Practices	Considering land value in planning and development to enhance economic opportunities Evaluating land suitability and mitigating hazards, such as floods, in mixed land-use planning Promoting environmentally friendly facilities within mixed-use neighbourhoods Reducing carbon emissions from excessive vehicular movement through efficient land use Prioritising sustainable development practices in mixed land-use planning and design

Source: Primary data from a field survey conducted in 2020.

reduction and hazard readiness. Prominent in managing disasters and resources, it proactively addresses urban vulnerability to environmental risks.

Policy and regulation dynamics shape development, and mixed land-use policies foster coexistence. Strong regulatory frameworks, land-use classification and state ownership influence growth. Policy and regulation dynamics encompass legal governance, mixed

Table 11
Policy and regulation dynamics.

Themes	Codes	Excerpts from the transcript
Policy and regulation dynamics	Hazard Mitigation Mixed Land-Use Policy Regulation Framework	Mitigating environmental hazards such as floods through appropriate land-use planning The policy of MLU aims to enhance the safety and vibrancy of urban areas Comprehensive framework with regulations and guidelines for setbacks, density and development controls
	Land-Use Classification Implementation Strategies	Introduction of a new classification system for mixed-use development based on density Using density standards to promote mixed land-use planning and development

Source: Primary data from a field survey conducted in 2020.

Table 12
Development transformation themes.

Themes	Codes	Excerpts from the Transcript
Development transformation	State Ownership Influence	State ownership enables comprehensive planning and impacts MUD
	Adaptability	There is a need to be adaptable to various planning scenarios in MLUP
	Strategic Urban Approach	Desire for a more strategic approach to urban development that aligns with planning trends
	Social Equality	Addressing social inequalities among diverse urban populations through MLUP
	Flexible Legal Framework	Shifting from rigid zoning to more flexible legal framework in MLUP
Organised Settlements	Transforming unplanned settlements into organised ones through MLUP	

Source: Primary data from a field survey conducted in 2020.

land-use policies, regulations and state impact. It signifies orderly growth, coexistence, well-defined policies, robust regulations and state involvement, all of which are significant in guiding urban evolution. The combination of legal instruments and state influence uniquely governs urban development.

Development transformation (DT) evolves urban spaces with adaptability, planning and social equity. Flexible legal frameworks, organised settlements and social equality are essential. DT prioritises positive change, responsive urban evolution and community well-being, emphasising sustainability and equitable progress.

3.4. Statistical test results

The qualitative investigation sought to determine the impact of contemporary MLUP on SEPE features in specific Addis Ababa regions. The study used the Freedman ANOVA test post hoc and Kendall's coefficient of concordance (W) to assess the null hypothesis (Ho) that there was no statistically significant difference in SEPE development outcomes between areas with MLUP in Addis Ababa's MCC, MC, SC and AGJ. In contrast, the alternative hypothesis (H1) predicted a statistically significant variation in the impact of modern MLUP techniques throughout the designated zones.

Table 13 presents the statistical results for residences in the MCC, MC, SC and AGJ regions. Significant variations in MCC were observed in terms of transportation modes, housing and time spent accessing different activities ($p < 0.001$, chi-square values 121.622 and 105.195). Similarly, in MC, differences were detected for both modes of transportation (chi-square = 46.147, $p < 0.001$) and time spent getting home to various uses (chi-square = 114.972, $p < 0.001$). The SC region revealed differences in the mode of transportation (chi-square = 100.635, $p < 0.001$) and time spent reaching various destinations (chi-square = 100.635, $p < 0.001$). In AGJ, the influence on residents' modes of transportation was considerable (chi-square = 12.022, $p < 0.05$), as was the time spent reaching diverse purposes (chi-square = 256.162, $p < 0.001$).

Briefly, the statistical analyses reveal significant disparities in the impact of modern MLUP on residents' modes of transportation and time spent accessing different activities across the most defined zones in Addis Ababa, supporting the rejection of the null hypothesis. These findings indicate that land-use planning has variable effects on the SEPE aspects of development in the defined areas, underscoring the importance of context-specific planning approaches.

4. Discussion

The main objective of this research was to thoroughly assess and evaluate the effects of contemporary MLUP on SEPE development in certain Addis Ababa zones. The target regions were MCC, MC, SC and AGJ. This study provided insights into the implementation and impact of MLUP in Addis Ababa, which aligned with SDG 11 and the African Union's Agenda 2063 for inclusive, resilient and sustainable urban settings.

The evaluation found that planners agreed on the usefulness of MLUP in physical development, but there were questions about function allocation. Socially, MLUP was widely embraced, but its economic impact assessment differed. Environmental issues included difficulty controlling land-use types, which led to the agreement that MUD has a harmful impact on the environment. Residents' regular movement routines, particularly taxi use, created disruptions, exposing the complexity of mixed land use.

Key informant interviews highlighted six themes influencing the effects of MUD, emphasising the importance of urban design,

Table 13

Summary test result of residences (R), Freedman ANOVA test post hoc, Kendall's coefficient of concordance (W) and average mean (AM).

Study area	Group	Variables	N	AM	Chi-square	df	p-value	W	Inference
MCC	R	Mode of transportation used	78	3.68	121.622	2	<0.001	0.78	Significant
		Time spent travelling from home to different uses or activities	78	3.53	105.195	7	<0.001	0.193	Significant
MC	R	Mode of transportation used	81	3.49	46.147	2	<.001	0.285	Significant
		Time spent travelling from home to different uses or activities	81	3.67	114.972	7	<.001	0.202	Significant
SC	R	Mode of transportation used	124	3.88	100.635	2	<.001	0.741	Significant
		Time spent travelling from home to different uses or activities	124	4.2	100.635	7	<.001	0.166	Significant
AGJ	R	Mode of transportation used	93	3.46	12.022	2	<.05	0.684	Significant
		Time spent travelling from home to different uses or activities	93	3.07	256.162	7	<.001	0.393	Significant

Source: Calculated from a field survey conducted in 2020.

infrastructure sharing, economic vibrancy, environmental resilience and policy frameworks for achieving sustainable and inclusive MUD in Addis Ababa. The findings emphasise the complexity of MUD implementation and highlight the need for context-specific planning approaches to foster sustainable urban development.

This study assessed the impact of MLUP in Addis Ababa, with an emphasis on SEPE issues. This study evaluated contemporary MUD practices in specific places and provided information about MLUP's effectiveness in fostering sustainable urban development. The key findings included overwhelming popular acceptability of MUD and agreement among planners on its primary goal and dominance in urban development. However, uncertainties regarding unfortunate function allocation, differing perspectives on economic development and environmental issues arise.

This study adds considerably to previous research on MUD in Addis Ababa and harmonises with SDG 11 [22,23] and the African Union's Agenda 2063 [24]. These findings are consistent with those of previous studies, such as [25,26]), which emphasised global and regional sustainability goals. The planners' viewpoints are consistent with those of [27], emphasising the significance of MLUP for sustainable and inclusive cities [27]. The findings on social acceptance are consistent with those reported by Ref. [28], who emphasised community engagement. The divided views on economic impact are consistent with those of [29], who acknowledge economic vibrancy, and [30,31], who see negative effects. The environmental difficulties identified are consistent with those raised by Ref. [32]. Residents' experiences are consistent with the relevance stressed by Refs. [33,34]. In addition, Robert & Brown Residents' experiences are consistent with the relevance stressed by Refs. [33–35] in comprehending the local community. The key informant perspectives align with the findings of [34], emphasising the diverse nature of MUD consequences. Statistical analysis supports quantitative findings from Refs. [23,36,37], underscoring the need for context-specific planning methodologies [38].

The alignment of MUD in Addis Ababa with SDG-11 and the African Union's Agenda 2063 is judged significant, demonstrating a global and regional commitment to sustainable urban development, according to Ref. [39]. The high level of agreement among planners on the effectiveness of MUD is significant, as it aligns with [40] work on MUD theory and social sustainability, demonstrating MUD's strategic significance in steering urban development. Concerns about ineffective function allocation are deemed less significant, with [41] providing a resource for analysing economic implications in urban regeneration. The widespread social acceptability of MUD is notable, consistent with the positive social consequences underlined by Ref. [1] in their evaluation of the social sustainability of MUD. The divided views on economic development are deemed less significant, with [42] serving as a reference for further contextual analysis. Environmental development challenges are consistent with the results of [43], which emphasised the importance of strong environmental legislation. Mobility habits and preferences are consistent with [37] research on the effects of MUD on urban mobility. Key informant themes are deemed relevant because they coincide with broader literature topics found by Ref. [44] in their analysis of the influence of MUD on urban sustainability. Referencing relevant material enhances the debate by providing a solid foundation for complete ideas.

The links discovered in the study data can be theoretically explained to improve our understanding. The integration of MLUP with SDG 11 and Agenda 2063 can be understood through sustainable urbanism theories, which emphasise integrated approaches to development [45]. The efficacy of MLUP is consistent with instrumental rationality, which prioritises utility and efficiency in planning processes [46,47]. Concerns about function allocation can be explained through institutional theory, highlighting the importance of clear institutional frameworks [40,48]. Divergent opinions on economic development reflect debates between neoclassical and urban political economy perspectives [49,50]. Environmental challenges align with ecological modernisation theory, emphasising the tension between economic development and environmental sustainability [10]. Residents' travel patterns are explained using time-geography theory [51], which emphasises spatial restrictions and possibilities [52]. Key informant themes are consistent with integrated planning theories that emphasise interconnection [45]. By embracing these viewpoints, the debate provides theoretical frameworks for comprehending MLUP dynamics in Addis Ababa, thus increasing the research's theoretical contribution to urban planning and development.

In conclusion, this study of MLUP in Addis Ababa provides a comprehensive understanding of the city's complex growth, including its socio-economic, physical and environmental factors. This examination emphasises the city's expansion in line with global sustainability measures such as SDG 11 and the African Union's Agenda 2063. Although this study underscores planners' agreement on the effectiveness of MUD in developing development strategies, it also raises concerns about incorrect function allocation, emphasising the need for improved planning approaches. Socially, MUD is widely accepted for establishing inclusive communities; however, different perspectives on economic growth indicate various outcomes. Environmental concerns, including land-use management and imprecise legislation, highlight the need for more explicit environmental regulations within the MUD framework. Residents'

experiences, particularly in terms of travel patterns and preferences, vividly demonstrate the dynamic nature of urban life as influenced by MUD, in which taxis emerge as the major means of transportation, delivering both convenience and disruption. The findings from the key informant interviews, which focus on six key themes, highlight the multifaceted effects of MUD and the critical importance of urban design, infrastructure sharing, economic vibrancy, environmental resilience and policy frameworks for achieving sustainable and inclusive MUD in Addis Ababa. Overall, this in-depth analysis not only adds to our existing knowledge of MUD but also smoothly integrates past studies, providing nuanced viewpoints that expand our understanding of mixed land-use design. This, in turn, strengthens the findings' validity and generalizability in the larger context of urban planning and development, providing useful recommendations for future projects in fast-rising cities.

In assessing the impact of MLUP in Addis Ababa, the study admits a number of constraints that may affect the application and reliability of its conclusions. These restrictions include sample selection, data collection, measurement, analysis and conceptualisation. Notably, the emphasis on specific zones within the city raises concerns regarding the applicability of the results to other places or cities. Furthermore, relying on self-reported data increases the risk of bias and errors, whereas cross-sectional design may ignore temporal differences. This study emphasises subjective evaluations and suggests the incorporation of more specific indicators of environmental impact assessment. Furthermore, caution is advised when applying the findings to cities with diverse contexts. The study encourages for future research to address these limitations transparently, contributing to a more.

Future research directions for the study of MLUP in Addis Ababa aim to improve understanding in various dimensions. Longitudinal studies beyond the temporal span (2002–2017) may reveal long-term trends and issues in sustainable development trajectories. Exploring the effectiveness and limitations of information and communication technology (ICT) integration, particularly smart city technologies, can increase the efficiency and inclusivity of MUD.

Comparative examinations of cities with different developmental trajectories can help better understand adaptive planning solutions. The expansion of variables within theoretical frameworks, such as indices of cultural variety, public health, and technological innovation, could provide a more complete understanding of the multiple effects of MLUP. Methodological diversity recommendations include using a combination of qualitative and quantitative methodologies, overcoming data collection limits with novel technology, such as real-time tracking, and contextualising conceptual frameworks for a more nuanced understanding. Future research findings should be strengthened by improving analytical approaches, using sophisticated statistical tools, and investigating public engagement in decision-making processes.

The research on MUD in Addis Ababa has ramifications at multiple levels, from individual residents to policymakers and theoretical frameworks. Individual inhabitants gain from understanding travel patterns and the influence of mixed land-use design on daily life, allowing them to make more educated decisions about their living arrangements and transit options. Urban planners and local governments can acquire a more detailed understanding of the implications in different zones, allowing for targeted measures to improve urban management. Businesses and developers can customise tactics to customer habits influenced by MLUP, resulting in more sustainable and effective operations.

On the policy front, this study emphasises the need for informed interventions, urging policymakers to refine land-use regulations, provide clarity on objectives and incorporate ICT solutions to enhance effectiveness. The study also contributes to the theoretical understanding of MLUP by integrating multiple frameworks, implying the need for refinements and exploration of additional dimensions, such as cultural diversity, public health and technological integration. Overall, the research's multi-level impact highlights its importance in addressing the complex challenges of MLUP in Addis Ababa, providing practical benefits, informing urban management practices, guiding organisational strategies, shaping policy decisions and contributing to the evolution of theoretical frameworks in urban planning.

The recommendations for MLUP are comprehensive and cover various aspects crucial for its successful implementation.

- **Integrate MLUP in urban planning:** MLUP should be an essential component of various urban planning frameworks such as master plans, structural plans, local development plans and urban design strategies.
- **Provide incentives to strengthen urban MUD:** Develop and implement incentive schemes to promote and strengthen the practice of UMD, fostering urban development.
- **Develop manuals for MLUP implementation and management:** Prepare comprehensive manuals to guide the implementation and management of MLUP. Encourage coordination among research institutes to advance MLUP development. Enhance neighbourhood skills for MLUP, particularly in collaboration with the private sector.
- **Support policies for MLUP as a catalyst for sustainable development:** Develop policy statements that recognise MLUP as a driving force for social, economic and environmental development, aligning with national and global sustainable development agendas.
- **Enhance MLUP through infrastructure development:** Focus on improving infrastructure, such as transportation, roads, railways and utilities, to support MLUP initiatives.
- **Prioritise MLUP in core urban areas and along transport corridors:** Develop effective strategies and measures for effective MLUP in central urban areas and along transport corridors. Ensure sound coordination among stakeholders to achieve this goal.
- **Increase awareness of MLUP benefits and risks:** Sensitise urban and municipal administrations to the benefits of well-implemented MLUP and the potential threats of unplanned or poorly managed development.
- **Build technical preparedness for institutional capacity:** Strengthen institutional capacity to design, build, finance and implement MLUP. Equip urban areas to be resilient, liveable, productive and efficient.
- **Establish hierarchical institutional frameworks for urban administration:** Implement a structured institutional framework across various tiers of urban administration (city, sub-city and woreda) in Addis Ababa to support MLUP.

- **Promote MLUP to create compact cities:** Use MLUP to create compact cities, minimise negative impacts on commuters and prevent excessive urban sprawl on the outskirts and neighbouring rural areas. Recognise ‘creation of compact and inclusive cities’ as a core principle of urban planning in Addis Ababa. Broaden the scope of MLUP beyond residential areas to include other land-use classifications.
- **Expand MLUP beyond residential Functions:** Extend MLUP to encompass various urban functions while considering compatibility, proportions and other relevant factors.
- **Elaborate on MLUP plans:** Develop detailed MLUP plans with clear patterns for planning, implementation and monitoring. Address policy implications to achieve objectives such as creating vibrant, sustainable, compact and contemporary cities. Enhance efficiency in analysing infrastructure and other urban elements.
- **Set Intensity Levels for MLUP:** Gradually increase the intensity of MLUP from core areas to the periphery, based on land market dynamics and the interests of the public and private sectors.
- **Establish patronage for MLUP execution:** Identify and support patrons and key figures responsible for overseeing MLUP execution.
- **Facilitate joint stakeholder forums:** Establish forums for stakeholders to collaborate and address MLUP concerns effectively.
- **Involve academic institutions:** Engage academia in MLUP matters to leverage research and expertise.
- **Encourage professional and industry involvement:** Involve professionals, associations, academicians, the construction industry and research centres in MLUP processes to ensure comprehensive and informed development. Encourage collaboration between government offices, consultants and clients to realise effective mixed-use development. Recommend the involvement of various offices, such as land strategy, land administration, land development, building permits and regulatory bodies, to facilitate coordinated efforts in MLUP.

Overall, these recommendations provide a holistic approach to integrating MLUP into urban planning processes and ensuring its successful implementation for sustainable urban development.

CRedit authorship contribution statement

Girmachew Tariku Jinoll: Writing – review & editing, Writing – original draft, Visualization, Software, Resources, Methodology, Conceptualization. **Liku Workalemahu:** Writing – review & editing, Supervision. **Dagnachew Adugna:** Writing – review & editing, Supervision.

Ethical approval and informed consent

Protocol was approved by the Ethical Review Board of EiABC, AAU comprised five committee members: Dr. Mintesnot Woldeamanuel (Chair), Dr. Fisseha Wegayehu (Member), Dr. Dipl-Ing Berhanu Woldetensae (Member), Dr. Dagnachew Adugna (Member), and Dr. Liku Workalemahu (Member).

This research paper received ethical approval from the Institute of Architecture, Building Construction, and City Development (EiABC), Chair of the Urban and Regional Planning Department, at Addis Ababa University, Ethiopia.

In accordance with the given mandate, before collecting primary data through a survey questionnaire, written informed consent was obtained. The PhD Thesis Proposal Evaluation Committee reviewed, evaluated, and commented on the proposal. The committee provided approval to proceed with the research work. The Ethical Approval Letter included conclusions, recommendations, and the evaluation results of the PhD thesis proposal.

Subsequently, the university issued cooperation letters to Bole, Kir-Kos sub-city, and other relevant institutions for the study. Confidential letters were sent via cellphone and email to individual respondents and offices. After obtaining informed consent from all subjects, individuals, and institutions involved in the study, data collection commenced.

Informed consent was obtained from all participants, as indicated in the supplementary document. Under the demographic characteristics, all participants were above 18 years old.

Reporting standards

This is original research work, highly significant for the current urban problem. The paper contains sufficient detail and references to permit others to replicate the work.

Duplicate publication

This paper is submitted only for this journal, and has not been previously submitted in the form of an abstract, as part of a published lecture or academic thesis, or as an electronic preprint.

Data availability statement

Word, IBM SPSS Statistics Version 20, data have been deposited at **Harvard Repository with the username: girmachew.tariku@eiabc.edu.et and the ID #360761**. For more information, refer to the ticket:

<https://help.hmdc.harvard.edu/SelfService/Display.html?id=360761&results=e3ec2afd5321b271f68842c3e59b2288>.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.heliyon.2024.e40814>.

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Research

The impacts of mixed land use planning on spatial development

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Abstract

This study, titled “the impact of mixed land use planning (MLUP) in Addis Ababa: socio-economic, physical, and environmental effects,” aims to assess the effectiveness of MLUP in addressing urban challenges such as overcrowding and service disparities. The research identifies significant gaps in the current implementation of mixed-use development in the city. Employing a mixed-methods approach, the study involves qualitative interviews with 14 key informants and 40 planners, complemented by quantitative surveys of 384 residents from four districts: Main City Center, Main Corridor, Secondary Corridor, and Around Goru Junction. Findings indicate a general consensus among planners regarding MLUP’s potential, yet residents’ express dissatisfaction with its economic contributions and the lack of regulatory clarity, raising concerns about sustainability. Additionally, travel patterns reveal reliance on taxis, suggesting inadequate transportation infrastructure. The study concludes that effective MLUP requires enhanced regulatory frameworks, improved transportation integration, and stakeholder engagement. These insights provide actionable recommendations for urban planners and policymakers, emphasizing the importance of balancing land uses to promote sustainable urban growth and enhance livability in Addis Ababa. Future research should further explore community engagement and the socio-economic implications of MLUP.

Keywords Mixed land use planning (MLUP) · Mixed-use development (MUD) · Socio-economic · Sustainability · Transportation · Urban growth

1 Introduction

Mixed-use development (MUD) involves integrating residential, commercial, cultural, and institutional purposes within a distinct area, ensuring physical and functional interconnectivity [1]. A healthy urban region requires a mix of uses to address zoning challenges [2–5], and MUD adopts mutual support and compatibility, though it also increases bureaucratic demands and introduces varied income groups [6–9] While MUD can be organized at different spatial and temporal levels [10].

This study draws on models based on the foundational concept of MUD, which has been shaped by several key frameworks. Jacobs’ (1961) model emphasizes the importance of combining multiple uses in a controlled manner [11],

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either horizontally or vertically, to avoid incompatibilities in urban environments. Rowley's (1996) model focuses on the physical form of MUD, influenced by factors such as urban texture, real estate markets, and public policy, while primarily addressing horizontal spatial dimensions [12]. Hoppenbrouwer and Louw (2005) further expanded on Rowley's model, adding a vertical dimension and considering the varied uses of space over time [13]. mode choice and distance traveled [11, 14], and recent research, new technology for smart cities [15] urban safety [16] effective community engagement [17] the new Urban agenda [18] to address emerging urban concepts like the 15-min city the concept of "Proximity", which is a guiding for urban and mobility planning [19]. This study model, which has been widely adopted, focuses on enhancing local accessibility, reducing travel times, and improving the urban experience.

Mixed-use development is thus a flexible concept, influenced by scale, use combinations, and urban texture, resulting in diverse configurations [20]. Small-scale, balanced mixes within limited spaces are generally preferred. This study focusing how MLUP effect on spatial development—the distribution of human activities, natural features, and man-made structures across metropolitan regions [21]. It highlights the disparities in access to opportunities between territories, such as districts, neighborhoods, and city regions. MLUP serves as a management strategy that guides, regulates, and controls land use change [22], with the aim of fostering a more livable spatial environment. The integration of mixed land uses is a characteristic feature of cities in the developing world, acting as a crucial tool in spatial planning [23]. This approach operates across multiple spatial levels and forms, supporting broad compatibility [24] with diverse urban development [25]. It affects the socio-economic, physical, and environmental activities of urban populations. Therefore, it is essential for all stakeholders to adhere to spatial development policies [26], engage in planning processes, and utilize strategies for promoting mixed-use land development [27, 28].

While the concept of mixed land use is not new, its formal application has evolved over time. Historically, urban development in many cities organically integrated various functions without formal zoning [29]. In the case of Addis Ababa, MUD has experienced numerous challenges since the city's establishment in 1886 [30]. During the early years, urban growth occurred organically until formal zoning regulations were introduced during the Italian occupation, leading to a segregated urban layout [31, 32]. Over the years, subsequent city planning efforts, such as the 1986 Addis Ababa Master Plan and its 2002 revision by the Office for the Revision of Addis Ababa Master Plan (ORAAMP), sought to address these issues by emphasizing MUD as a solution to emerging urban challenges. Despite these efforts, challenges such as overcrowding, pollution, and unequal service distribution arose from poorly implemented MUD, highlighting the socio-economic and environmental risks involved [33–35]. In Addis Ababa, the shift from traditional zoning to Mixed Land Use Planning (MLUP), formalized by the Office for the Revision of Addis Ababa Master Plan [30], has faced numerous challenges, particularly around functional specialization and incompatibility. According to the Addis Ababa City Development Plan (2004–2014), settlement patterns have deteriorated, and newer residential areas show a decline in social diversity [36].

This research investigates the impact of MUD on socio-economic, physical, and environmental (SEPE) development in Addis Ababa, focusing on key areas such as the Main City Center (MCC), Main Corridor (MC), Secondary corridor (SC) and Around Goru Junction (AGJ). In these areas, functional incompatibility has led to issues such as long commuting times, inadequate infrastructure, and misconceptions about the benefits of MUD [35, 37]. While MUD is often praised for creating pedestrian-friendly environments [38, 39], poor planning and regulatory violations have limited its success in Addis Ababa [33]. To promote sustainable urban development, a balance must be struck between residential and other land uses, ensuring that all parts of the city are well-integrated and adequately served [10, 40].

While MLUP is designed to promote sustainable urban growth, its ineffective implementation has led to several issues, including noise pollution, overcrowding, and the displacement of residents due to the unregulated mixing of residential and commercial spaces [41, 42]. The research also highlights transportation and inefficient traffic management exacerbate congestion [37, 43]. Furthermore, socio-economic and environmental concerns, such as increased commuting times and urban sprawl, are often neglected, contributing to a lower quality of life in these areas [44, 45]. To address these challenges, the study emphasizes the need for enhanced management tools and stronger regulatory frameworks, including local development plans (LDPs) and improvements in public transportation, to better integrate land use and transport planning. These solutions are essential for optimizing MLUP's potential while minimizing its negative effects on SEPE development, ultimately supporting sustainable urban growth in Addis Ababa [33].

This study significantly adds to the body of knowledge on MLUP, particularly in rapidly urbanizing cities like Addis Ababa. By focusing on areas such as MCC, MC, SC, and AGJ, the research provides insight into MLUP's challenges and opportunities. The study also contributes to discussions on urban development by addressing the SEPE challenges posed by MLUP and connecting urban planning theories with practical applications.

Overall the research provides crucial insights for urban planners in Addis Ababa, offering a solid framework to tackle the city's spatial, social, and economic challenges. By focusing on improving LDPs, the study offers recommendations for enhancing land use efficiency and urban governance. It identifies barriers to effective MLUP and proposes policy refinements to align urban development with sustainability goals, ensuring inclusivity and resilience. Geographically focused on four key areas (MCC, MC, SC, and AGJ) the study analyzes the impact of MLUP on SEPE development. It aligns its findings with SDGs. The study spans the period from 2002 to 2017, a crucial era marked by significant urban policy changes in Addis Ababa, allowing for a comprehensive analysis of the evolution of MLUP. While offering valuable insights into MLUP's impact on the city, the research acknowledges its limitations. Geographically, the study is confined to Addis Ababa, meaning its findings may not be easily generalizable to cities with differing governance structures. Additionally, more recent policies and trends introduced after 2017 are not fully reflected, highlighting the need for future studies to address these gaps. Nevertheless, this research makes a significant contribution to understanding MLUP's role in urban planning and provides practical recommendations for policymakers aimed at promoting sustainable growth in alignment with regional and global development goals. The main objective of this study to be addressed in the manuscript is the impact of MUD on SEPE development in Addis Ababa.

2 Materials and method

The study examines four critical areas in Addis Ababa: The Main City Center (MCC), Main Corridor (MC), Secondary Corridor (SC), and Around Goru Junction (AGJ), employing a mixed methods approach to provide a comprehensive understanding of the impacts MLUP in these regions. This methodology integrates both quantitative and qualitative research techniques to capture the complex nature of urban development and its effects on various aspects of city life [46, 47]. The research design includes detailed participant selection criteria, data collection methods, and analysis procedures, ensuring a robust evaluation supported by qualitative and quantitative strengths, along with rigorous ethical considerations. The study utilizes a Likert scale to measure planners' agreement and assess the impact of MLUP on socio-economic, physical, and environmental (SEPE) development. Key informant interviews and questionnaires designed for residents are conducted to gather data on MLUP effects and relevant regulations concerning mixed land use development (MUD). This multifaceted approach allows for the identification of significant impacts of MLUP through discussions with decision-makers and urban planners, revealing which factors pose challenges and which groups are affected. Additionally, the research evaluates the effectiveness of MLUP theories and explores how planning instruments, contextual factors, and regulatory compatibility influence urban settings. The study further investigates the effects of MLUP on economic vibrancy, environmental inequalities, and residents' daily activities, including commuting distances and transportation methods, employing snowball sampling to gauge agreement among 40 urban planners and key informants regarding planning policies.

2.1 Site selective criteria

By immersing oneself in these locales and using detailed selective criteria, one can select the study site (refer to Table 1).

2.2 Study area

The research focuses on the strategic sub-cities of Kirkos and Bole within Addis Ababa, Ethiopia, examining the impact of Mixed Land Use Planning (MLUP) on spatial development in selected areas. Specifically, the study investigates Woreda 6/7/9/10 in the Main City Center (MCC), Woreda 1, 2, and 9 along the Main Corridor (MC) in Kirkos, and Woreda 4 in the transition zone of Sub-Arterial Street (SAS) and Woreda 11 (Goru) in the periphery of Bole. These locations were chosen based on the Structural Plan Manual (2012) (see Fig. 1).

2.3 Updating maps and preparing key questions

To create a new map, the most recent land-use data from the Addis Ababa Plan Commission [33], as well as the Ethiopian Mapping Agency (EMA) 2016 Air Map and Google Map 2023, are superimposed. Following the site survey update, the most recent map that satisfied the requirements was created (see on supplementary material Appendix B Figure S1). The information obtained from the two sub-cities ranges from 2002 to 2017. This dual-source approach

Table 1 Detail of selective criteria for each study areas (MCC, MC, SC, and AGJ)

Characteristics	MCC	MC	SC	AGJ
Distance from the city center (Arada Georges) to the study area	3 km	5 km	7 km	10 km
Social characteristics	Modern lifestyle with reduced local and traditional lifestyle	Modern streetscape and high corridor development	Moderate streets and medium corridor development	Predominantly local and traditional lifestyle
Economic characteristics	Highest business transaction with sets of international offices	High density and vibrant economy	Low-rise houses with more vibrant economy	Link between suburb and traditional economy
Public service access	Available international and national institutions	Available international and national institutions	Basic goods and services, more commercial along sub-arterial	Local and more traditional services and goods
Transportation accessibility	High: LRT, Bus, Taxis, and private automobiles are available	Moderate: Bus, Taxis, and private automobiles are available	Moderate: Bus, Taxis, and private automobiles are available	Moderate: Bus, Taxis, and private automobiles are available
Land valuation	Highest	Higher	High	Moderate
Urban Area, corridors, and Junction development levels	Highest	Higher	High	Moderate
Settlement types	Main City Center: very important functions available such as international organization set	Main Corridor: connects Bole International Airport to Main City Center	Sub-corridor: highly active due to shops	Junction with stations, connects to expressway
Urban settlement inception period	Established in 1889 [48]	1948	1960	1970
Corridor development level	Highest	Primary	Secondary	moderate

Source: Authors, based on primary and secondary data from a 2020 field survey

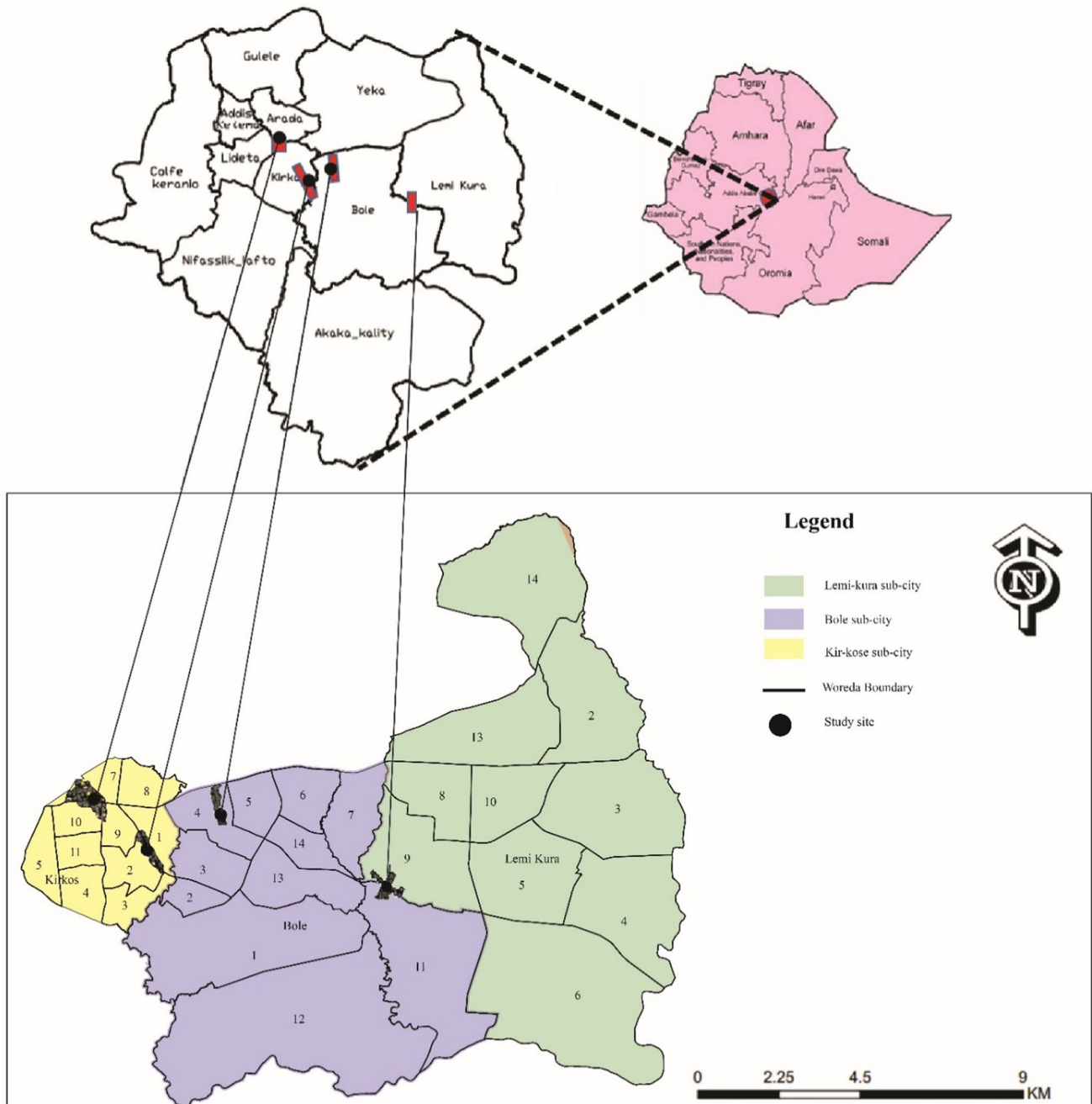


Fig. 1 Location map of the study areas in Kirkos and Bole Sub-cities (source: Structural Plan Manual, revised version, May 2012, Addis Ababa)

integrated [49] primary data obtained through interviews, surveys, and observations, along with secondary documents and information collected from the Addis Ababa City Planning Commission and the selected study site (see supplementary material, Appendix B, Table S3). For the physical survey, a checklist, map, key informant interview, and critical questions were developed. The major issues were indicated and measured variables such as planner's agreement and disagreement in SEPE development aspect, residency trip distance, time spent reaching different uses, rate of travel outside the study area, mode of transportation used to reach,

2.4 Research design

In Fig. 2, the study utilized a mixed-method, exploratory sequential design to investigate a phenomenon. This approach involved initially collecting qualitative data, followed by collecting quantitative data to elucidate the relationships uncovered in the qualitative data [50]. There were two main periods in the creation of questionnaires and interviews: qualitative and quantitative. During the qualitative phase, a literature review, assessment of planner preference through Likert scale, key informant interviews with planning experts and decision makers were conducted in order to generate a group item using the snowball technique, and household interviews were conducted to gain an overall perspective on existing knowledge and practice.

The study thoroughly investigated both primary and secondary sources. Primary data was collected from a diverse range of participants, including Planners and key informants (see Appendix A, Table S2), representatives from planning offices, government and non-government stakeholders, developers, and residents in the research areas (see Appendix A, Table S1) were collected through random sampling [51, 52]. The acquisition of primary data required a comprehensive strategy that included interviews, surveys, and observations. Secondary data was acquired from the Addis Ababa city Planning Commission offices (AACPPO, 2017) and rigorously compiled from various scholarly books, official reports, public documents, and government records. This dual-source technique ensured a broad and well-rounded dataset for the investigation [49].

This study's research design is adaptable and suited to the unique objectives at hand. We use a comprehensive strategy that encompasses thematic and descriptive analysis, as well as the methodology recommended by [50]. We did pre-testing during fieldwork to ensure the effectiveness and reliability of our data-gathering instruments, such as questionnaires and interviews. This iterative approach allows us to tailor our methodologies to the specific needs of our research while also ensuring the robustness of our research design. The study included a broad group of participants: The planners (40 in total. 10 for each study area) have expressed their perspectives on the significance of these factors, using a Likert scale to indicate their levels of agreement or disagreement, Consequently, they have shared their observations and findings regarding the outcomes they have encountered during the evaluation process. 14 key informant senior planners, managers, and decision-makers recruited using the snowball technique—who were located in both sub-city zone. In addition, 384 households from MCC, MC, SC, and AGJ were involved. Each area had 81, 81, 126, and 96 sample sizes, respectively.

2.5 Qualitative phase and detail

During the qualitative phase, a literature review and key informant interviews with planning experts, decision-makers, and stakeholders were conducted to explore the socioeconomic, physical, and environmental impacts of MLUP in Addis Ababa. Using the snowball technique, 14 key informants were identified, and household interviews were conducted to provide a broader understanding of existing knowledge and practices. The interviews, which included both open- and

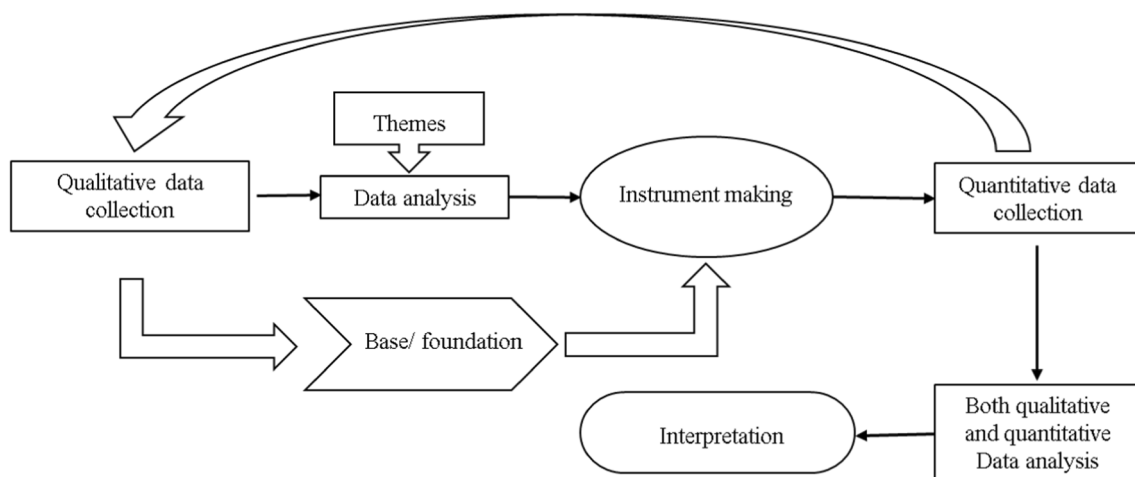


Fig. 2 Study design: Sequential exploratory mixed-methods approach. Source: Authors, schematic research design, 2022

closed-ended questions, helped assess MLUP's impact in core, transitional, and suburban areas of the city. The data collected were analyzed through thematic analysis, systematically identifying and categorizing themes from the textual material (see Appendix B, Table S2 on supplementary document). Interview summaries were documented and recorded during the conversations, and transcripts were prepared from field notes and video recordings on the same day, which were later compiled into individual reports. The raw data were then coded for further analysis.

2.6 Quantitative phase and detail

The quantitative phase involved household surveys conducted among residents in the MCC, MC, SC, and AGJ areas. A sample size of 384 was determined using statistical formulas to ensure representativeness. The surveys included questions about residency, trip distances, time spent, travel modes, and challenges faced. The sample size was determined using the formula $n = z^2pq/d^2$ considering a 95% confidence level, with p set at 0.5, q (computed as $1 - p$), and a margin of error d set at 0.05 [53], resulting in a sample size of 384. An adjustment factor was applied for finite population correction. The sample sizes for each area were as follows: 81 for MCC, 81 for MC, 126 for SC, and 96 for AGJ. Data were collected systematically through random sampling in designated areas (see Table 2).

2.7 Data collection

Data collection for this study was conducted using a comprehensive approach that ensured the effectiveness and reliability of the instruments employed. Pre-testing of these instruments was performed during fieldwork, allowing for iterative refinements to better meet the specific needs of the research and thereby enhancing the robustness of the research design [50]. The methodology incorporated both thematic and descriptive analyses, aligning with established research practices. Qualitative methods included key informant interviews and household interviews, which provided valuable insights into the impacts of mixed land-use planning (MLUP) on socio-economic, physical, and environmental development. On the quantitative side, surveys were administered using a Likert scale to assess planners' agreement and to evaluate the effects of MLUP across various dimensions, including social, economic, physical, and environmental aspects (see Appendix B, Table S4, S5, S6 and S7 on supplementary document).

2.8 Data analysis

Data analysis in this study utilized a combination of Likert scale measurements, thematic analysis, and descriptive approaches. Qualitative data collected from key informant interviews was subjected to thematic analysis to identify key themes and insights regarding the impacts of MLUP. Meanwhile, quantitative data obtained from planners was analyzed using the Likert scale to gauge levels of agreement and disagreement concerning the perceived success of MLUP. Household survey data were processed with statistical methods to identify trends and patterns related to the effects of MLUP. To ensure the effectiveness and reliability of the data-gathering instruments, such as questionnaires and interviews, pre-testing was conducted, which contributed to the overall rigor of the research design [50].

This Table 3 summarizes each step of the research methodology, outlining the key activities and procedures involved in the study.

This study employs a mixed-method exploratory sequential design to assess the impacts of mixed land use planning (MLUP) on spatial development in Addis Ababa, specifically in the Bole and Kirkos sub-cities, focusing on areas like MCC, MC, SC, and AGJ. The research examines how MLUP influences social, economic, physical, and environmental

Table 2 Number of representative household respondents from both sub cities

Name of sub city	Targeted population	Share of one sub city from the targeted population	Study site	n
Kirk's	59,589.8	160.22	MCC	81
			MC	81
Bole	83,225.4	223.77	SC	126
			AGJ	96
Total	142,815.2	384		384

Source: CSAE: Population projection for Ethiopia 2017–2037, Addis Ababa, July 2013

Table 3 A comprehensive breakdown of the research methodology presented in a table format:

Step	The key activities	Description
1	Study locations	Selected areas include Woreda 6/7/9/10 at the Main City Center (MCC), Worde 1, 2, and 9 along the Main Corridor (MC) in Kirk's, and Woreda 4 in the transition zone of Sub-Arterial Street (SAS) and Woreda 11 (Guru) in Bole
2	Map update and key questions preparation	Utilized the most recent land-use data, Air Map from EMA, and Google Map 2023. Developed key questions related to residency, trip distances, time spent, travel modes, challenges, etc
3	Research design	Adopted a mixed-method, exploratory sequential design. Conducted qualitative phase with literature review, planner agreement and dis agreement on SEPE aspect, key informant interviews, and thematic analysis. Followed by the quantitative phase with household surveys
4	Data collection	Primary data collected through interviews, surveys, and observations. Secondary data obtained from Addis Ababa city Planning Commission offices and various sources
5	Qualitative sample	Key informant interviews (n = 14) with planning experts, decision-makers, and stakeholders. Thematic analysis applied to responses
6	Quantitative sample	Urban planners (n = 40) responded, and their answers were analyzed using a Likert scale Household surveys with residents from MCC, MC, SC, and AGJ areas (n = 384). Sample size determined using statistical formulas, ensuring representativeness
7	Community engagement	Engaged members of the households, planners and decision makers in each study area
8	Conclusion	Study's adaptable approach provided insights into the impact of MLUP on spatial development in Addis Ababa

Table 4 The percentage of MLUP impact on the physical development of the study site

EQ of physical development	SD (%)	D (%)	UN (%)	A (%)	SA (%)
The objectives of MLUP were frame the planning instruments	7.5	5.0	17.5	50.0	20.0
MLUP is more important type of planning than any other type of planning. in Addis Ababa context	7.5	10.0	30.0	27.5	25.0
MLUP improperly allocate the best function at a given point	2.5	17.5	22.5	40.0	17.5
MUD is most likely land use Management for Addis Ababa city context	5.0	12.5	20.0	22.5	40.0

Source: Authors, summarize interview result, 2020

Table 5 The percentage of the frequency of social development at the study site

EQ of social development	SD (%)	D (%)	UN (%)	A (%)	SA (%)
MUD has successful in current social development	10.0	30.0	22.5	30.0	7.5
MUD favor some group of the city dwellers	12.5	12.5	25.0	35.0	15.0
MUD is maximize the social development result in minimum cost	7.5	20.0	30.0	22.5	20.0
MUD is highly dependent on and intertwined with the norms, values, and cultures of a society	12.5	15.0	27.5	30.0	15.0
The implementation of MUD has high degree of social acceptability	5.0	17.5	25.0	40.0	12.5

Source: Authors, summarize interview result, 2020

development while identifying challenges, assessing impacts on urban infrastructure, and analyzing travel patterns. Selection criteria for residents consider demographic composition, proximity to urban functions, household travel behaviors, and community engagement to provide a comprehensive understanding of factors influencing MLUP. Key socioeconomic indicators such as household income and employment status, along with physical and environmental indicators like the distribution of residential and commercial spaces, air quality, and green space accessibility, are used to measure MLUP's diverse impacts. The study incorporates qualitative and quantitative data, beginning with planners' perspectives on MLUP implementation, followed by key informant interviews to identify themes, and household surveys to validate findings statistically. This multifaceted approach ensures a nuanced understanding of the complex relationship between MLUP and urban development, combining subjective insights with objective data to generate actionable recommendations for sustainable urban growth in Addis Ababa.

3 Results

This study provides an in-depth examination of the impacts of MLUP on the SEPE dimensions in Addis Ababa, integrating perspectives from urban planners, observational data, and statistical analyses. Utilizing Likert scale responses and qualitative inquiries, it highlights both consensus and discrepancies regarding the effectiveness of MLUP, revealing complex implications for urban planning. The research explores key metrics, including travel distances, patterns, transportation modes, and challenges stemming from misconceptions about MUD. By systematically analyzing these factors, the study identifies significant challenges and delves into the underlying causes of the MUD dilemma on SEPE dimensions, ultimately offering crucial insights for policy formulation and urban development strategies. The findings indicate a transition in Addis Ababa from traditional mixed-use patterns to more regulated zoning, emphasizing the necessity for effective management of land use to mitigate potential adverse developmental outcomes. Consequently, this section assesses the implications of MLUP on spatial development across four urban areas: MCC, MC, SC, and AGJ.

3.1 Planners' perspectives

Planners provided their perspectives on SEPE aspects of MLUP through a Likert scale, indicating their levels of agreement or disagreement (See Tables 4, 5, 6 and 7). They shared their observations and findings from the evaluation process, which addressed SEPE development. The evaluation revealed that there was strong consensus that MLUP's primary objective

Table 6 The percentage of frequency of economic development at the study area

EQ of economic development	SD (%)	D (%)	UN (%)	A (%)	SA (%)
MUD has a negative effect in economic development	17.5	32.5	22.5	20.0	10.0
MUD has create vibrant and active economy in study area	17.5	35.0	20.0	22.5	5.0

Source: Authors, summarize interview result, 2020

Table 7 The percentage of frequency of environmental development at the study areas

EQ of environmental development	SD (%)	D (%)	UN (%)	A (%)	SA (%)
Controlling the type of use, in study area is difficult	10.0	20.0	12.5	45.0	12.5
Can we say there is unclear mixed use environmental implementation regulation instrument	0.0	15.0	17.5	35.0	32.5
MUD has a negative effect on environment	0.0	10.0	22.5	47.5	20.0
MUD has environmental inequality in the same and different generation	0.0	17.5	32.5	19.5	20.0

Source: Authors, summarize interview result, 2020

was to shape planning tools, with MUD seen as the dominant form of urban development in Addis Ababa. Socially, the introduction of MUD was widely accepted, but there was significant disagreement about its economic impact, with many believing that MUD has not effectively contributed to economic prosperity in the study areas. The most consensus was found around the environmental challenges, as key informants agreed that MUD lacks clear regulations and has had negative environmental effects.

The items with the highest consensus and strong agreement predominantly center on the notion that the primary objective of MLUP was to influence the design of planning tools. Additionally, there is a widely held belief that MUD represents the dominant form of urban development within the framework of Addis Ababa city.

The aspect with the most unanimous agreement is that the introduction of MUD is widely accepted socially.

The most notable point of contention revolves around the notion that MUD has failed to effectively contribute to the development of a thriving and prosperous economy in the study areas.

3.2 Key informant interview result

Table 8 outlines the major impacts of mixed land use planning and development in the selected study areas of Addis Ababa—MCC, MC, SC, and AGJ. Key themes include the facilitation of ownership and planning, where state ownership often positively influences planning by minimizing individual opposition and aligning with public interests. However, challenges arise from issues related to state ownership, such as complications with licensing, implementation, land acquisition, and investment adequacy, which hinder developers' ability to execute their plans effectively. The dynamics of development are also impacted, emphasizing the importance of balancing compensation, investor rights, ownership alignment, and stakeholder relationships for long-term success. Additionally, there is a call for alternatives, including private ownership and the introduction of a free landholding system, which could provide greater flexibility for landholders. The effects of mixed use are highlighted, showcasing state ownership as a facilitator for such developments, while environmental considerations emphasize the need for regulation through structured planning and title deed management.

3.3 Outcomes of residence

In this section, we meticulously gather feedback from residents to investigate the effects of mixed land use planning in the research areas of MCC, MC, SC, and AGJ. Utilizing a carefully crafted set of evaluation questions, we explore various factors, including the proximity and frequency with which residents leave their neighborhoods for essential activities, the transportation modes used to access public and municipal services, and the ongoing challenges associated with urban mixed land use. This thorough approach aims to provide a comprehensive understanding of the impacts on the community.

Table 8 Major impacts of mixed land use planning and development in selected study areas (MCC, MC, SC, and AGJ) in Addis Ababa city

No	Theme	Codes	Excerpts from transcript
1	Ownership and Planning Facilitation	State facilitation, legal rights facilitation, ownership mix influence, dominance of the planning office, and government control	State ownership often has a positive effect on planning since it enables planning without individual opposition or conflicting interests that may be opposed to the public interest
2	Challenges and Complications	State Ownership Issues, License Office Issues, Implementation Issues, Occupation Complications, Land Acquisition Issues, Investment Sufficiency	State ownership makes it difficult for developers to execute their plans
3	Impact on Development Dynamics	Compensation Impact, Investor Rights Impact, Ownership-Planning Misalignment, Stakeholder Dependence	Balancing remuneration incentives, investor rights, ownership alignment, and stakeholder relationships is critical for determining a company's trajectory and long-term performance
4	Call for Alternatives	Suggestions for Private Ownership, Free Land System, and Private Ownership Call	A suggestion is made to implement a free landholding system as an alternative to the lease holding system, allowing for more freedom for landholders and flexibility in development
5	Mixed-Use Effects	Encouragement, Positive Leasing Aspects, and Workplace Complications	State ownership encourages mixed-use developments and agglomeration
6	Environmental Considerations	Regulation Planning	The Structural Plan-regulated title deed

Source: Authors, summarize interview result, 2020

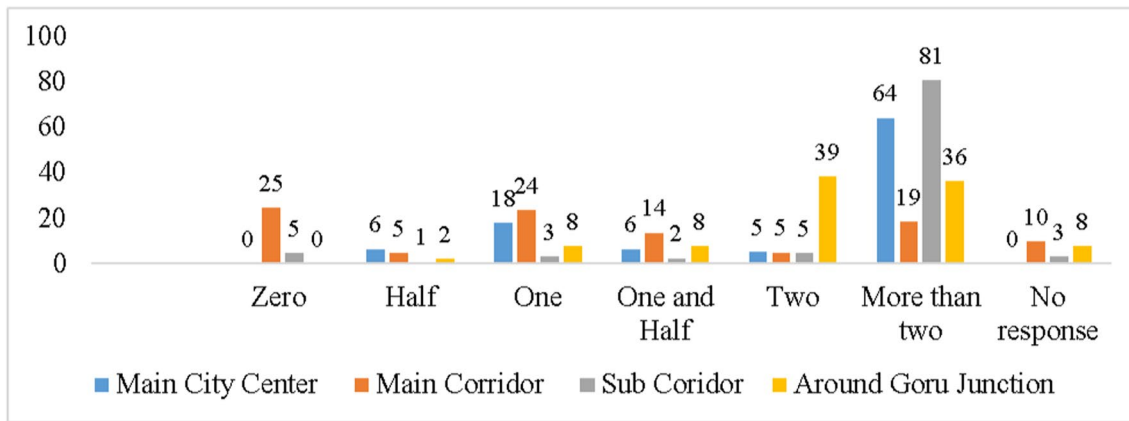


Fig. 3 Distance travel, residence outside their neighborhood (in km)

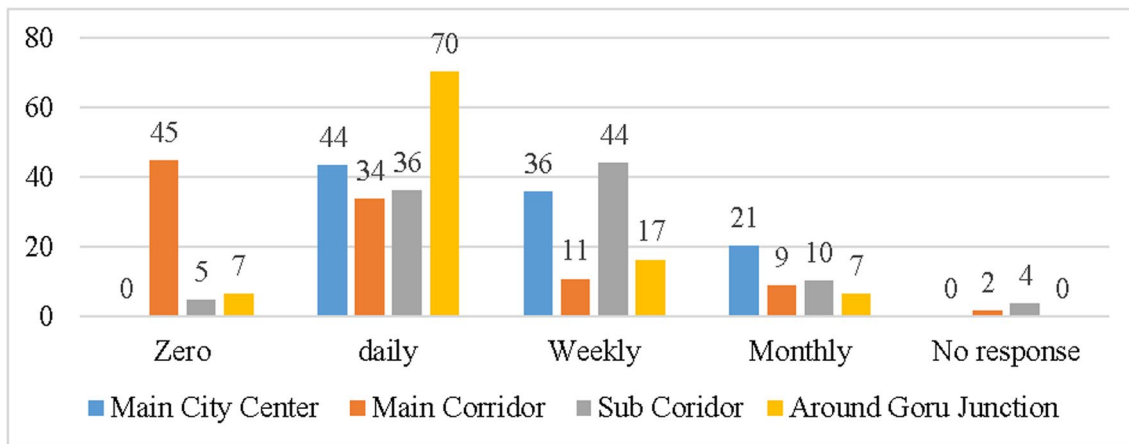


Fig. 4 Rate of travel for residences

3.3.1 Residences

Individuals residing permanently in the study area lead their daily lives, fostering a deep sense of belonging.

Figure 3 compares residential travel distances in four research locations (MCC, MC, SC, and AGJ) measured in kilometers. Overall, SC inhabitants traveled the most distance, with 81% covering more than two kilometers, more than doubling the distance of AGJ residents. SC and MCC had higher travel frequencies than AGJ and MC, while MCC had the second-highest distance traveled of the four locations, at 64%.

Figure 4 shows the distribution of residence travel frequencies (daily, weekly, monthly, and no travel) in four research areas (MCC, MC, SC, and AGJ) in days. Overall, AGJ had the highest travel rate, while MC had the lowest. The shift from daily to monthly travel costs grew dramatically across the board, with MC having the lowest daily rate at 34%, similar to SC's rate of 36%. AGJ residents had the highest daily rate of 70%, which was nearly 26% higher than MCC's rate.

The bar chart in Fig. 5 depicts the transportation choices of residents in MCC, MC, SC, and AGJ. Notably, residents of the sub-corridor strongly prefer cabs, in contrast to MC, where taxi usage is the lowest. Taxis, buses, and private vehicles are popular modes of transportation in SC, MCC, and AGJ, with utilization trends varying throughout all studied locations. SC residents, in particular, rely extensively on taxis (77%), exceeding MCC users (49%). Furthermore, bus usage is higher in MCC (about 18%) than in SC (around 10%).

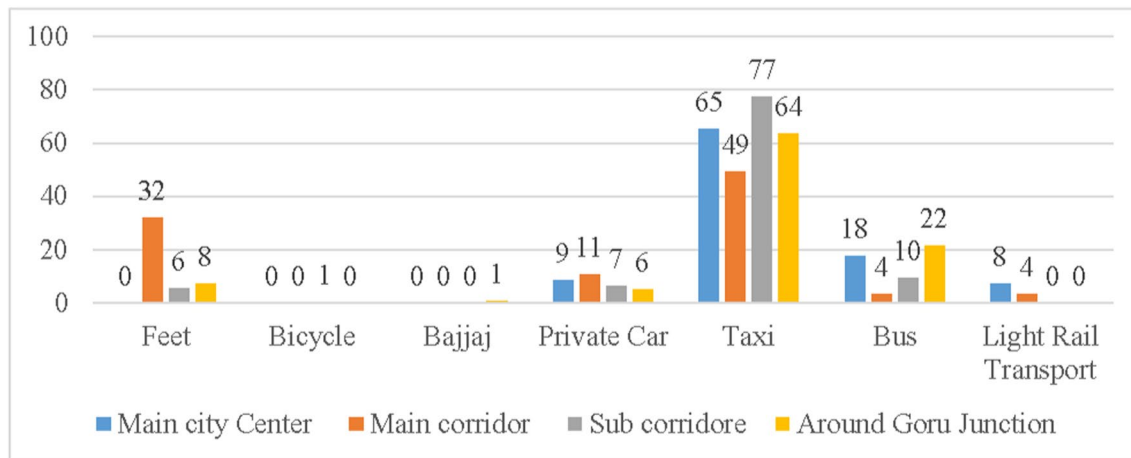


Fig. 5 shows the transportation choices of residents to travel for socio-economic purpose from study areas (MCC, MC, SC, and AGJ)

4 Discussion

This study investigates the impacts of MLUP on the SEPE dimensions of urban development in Addis Ababa, employing both statistical and qualitative methodologies to gather insights from urban planners and residents. The findings reveal a general consensus among planners regarding the intended benefits of MLUP, particularly its role in enhancing urban planning tools. However, opinions diverge significantly on its economic efficacy, with many residents expressing dissatisfaction with its contribution to economic growth. This discrepancy highlights a gap between the theoretical advantages of MUD and the on-the-ground realities experienced by local communities.

While MUD is socially accepted, the study indicates that its economic benefits may not be as pronounced as anticipated. Respondents frequently noted that MLUP has not sufficiently stimulated local economies, a concern that contrasts with findings from cities like Portland and Vancouver, where mixed-use developments have effectively reinforced economic vitality [3, 54]. This divergence may suggest that the unique socio-economic context of Addis Ababa, marked by high levels of informal employment and socio-economic disparity, poses challenges that MUD has yet to overcome.

Environmental issues also emerged prominently in the discussion. Respondents highlighted a lack of clear regulatory frameworks governing MUD, leading to negative environmental impacts. This aligns with findings in rapidly urbanizing regions, which underscore the importance of robust regulations in achieving sustainable urban outcomes (Satterthwaite, 2016). The absence of these frameworks raises serious concerns about the long-term sustainability of MLUP initiatives in Addis Ababa.

Travel patterns analyzed in the study reveal that residents in the Secondary Corridor (SC) travel longer distances and heavily rely on taxis for transportation, suggesting both accessibility and infrastructural challenges. This dependence on taxis may indicate a failure to integrate transportation planning effectively with MLUP, thereby undermining its intended benefits of creating more connected urban spaces [55]. Furthermore, the observed travel patterns emphasize the necessity for comprehensive planning that aligns transportation infrastructure with mixed-use development to facilitate improved mobility and access.

The study presents several important considerations. The sample size, sourced from various urban regions, may not fully represent all demographic groups, particularly marginalized communities, which could influence the diversity of perspectives. Additionally, the use of self-reported data and Likert scale surveys might not capture the complexity of perceptions regarding MLUP. Future research could enhance understanding by incorporating qualitative measures, such as focus group discussions, to gather a wider range of insights [41]. Furthermore, the distinct socio-economic and cultural context of Addis Ababa may limit the applicability of the findings to other urban areas.

In light of these findings, future research should aim to explore the impacts of MLUP more comprehensively by considering socio-economic variables, community engagement, and long-term effects of urban policies. Investigating the relationship between transportation patterns and mixed-use development will also be crucial for understanding how to enhance accessibility in urban settings. Policymakers are urged to develop clearer regulations and guidelines

that incorporate community input, ensuring that MLUP not only meets its intended goals but also addresses the immediate needs of local populations.

5 Conclusion

This study aims to enhance urban development in Addis Ababa through the effective implementation of Mixed Land Use Planning (MLUP) by examining its social, economic, physical, and environmental impacts, identifying associated challenges, and analyzing residents' travel patterns. The findings indicate that while MLUP enjoys social acceptance, its economic and environmental impacts are complex; specifically, it has struggled to foster economic growth and faces significant environmental challenges due to unclear regulations. For successful mixed-use development, it is crucial to establish clearer regulatory frameworks, enhance resource management, and improve stakeholder coordination. The insights gained can help urban planners, policymakers, and community stakeholders refine their strategies and better align land use with social and economic needs. Future research should focus on developing robust regulatory frameworks to enhance MLUP effectiveness, optimizing resource utilization, and improving stakeholder engagement. Additionally, unresolved questions about demographic influences on perceptions of MLUP effectiveness and regulatory measures addressing environmental challenges need further exploration to facilitate smoother implementation of mixed-use developments.

Author contributions Girmachew Tariku: Conceived, designed and performed the research; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; wrote the paper. Dr Liku Workalemahu: Conceived, developed the research; Examined and interpreted the data; Contributed reagents, materials, analysis tools or data; wrote the paper. Dr Dagnachew Adugna: Conceived and advice the research; Analyzed and interpreted the data; wrote the paper.

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Data availability The collected data was stored in both hard and soft copies and generated using SPSS, as referenced in the article. The datasets were obtained through interviews, questionnaires, and site surveys. The data were analyzed both qualitatively and quantitatively using thematic and descriptive statistics. The data presented in this study are available from the corresponding author and can be provided upon the publisher's request. Additionally, the data can be found in the Harvard Repository with the username: girmachew.tariku@eiabc.edu.et and the ID #360761. For more information, refer to the ticket: <https://help.hmdc.harvard.edu/Ticket/Display.html?id=360761>. Affiliations Correspondence concerning to this article should be addressed to Addis Ababa University, EiABC, Department of Urban and Regional Planning, Addis Ababa, Ethiopia.

Fundamental errors The author responsible for correcting any fundamental errors or inaccuracies in our published work will cooperate with the editor, including providing evidence where requested.

Reporting standards This is original research work, highly significant for the current urban problem. The paper contains sufficient detail and references to permit others to replicate the work.

Confidentiality Primary and secondary data and information were obtained from currently existing government offices (refer to the manuscript).

Additional information No additional information is available for this paper.

Declarations

Ethics approval and consent to participate Protocol was approved by: The Ethical Review Board comprised five committee members: Dr. Mint-esnot Woldeamanuel (Chair), Dr. Fisseha Wegayehu (Member), Dr. Dipl-Ing Berhanu Woldetensae (Member), Dr. Dagnachew Adugna (Member),

and Dr. Liku Workalemahu (Member). This research paper received ethical approval from the Institute of Architecture, Building Construction, and City Development (EiABC), Chair of the Urban and Regional Planning Department, at Addis Ababa University, Ethiopia. In accordance with the given mandate, before collecting primary data through a survey questionnaire, written informed consent was obtained. The PhD Thesis Proposal Evaluation Committee reviewed, evaluated, and commented on the proposal. The committee provided approval to proceed with the research work. The Ethical Approval Letter included conclusions, recommendations, and the evaluation results of the PhD thesis proposal. Subsequently, the university issued cooperation letters to Bole, Kir-kos sub-city, and other relevant institutions for the study. Confidential letters were sent via cellphone and email to individual respondents and offices. After obtaining informed consent from all subjects, individuals, and institutions involved in the study, data collection commenced. Informed consent was obtained from all participants, as indicated in the supplementary document. Under the demographic characteristics, all participants were above 18 years old.

Consent for publication This paper is submitted only to Discover Cities and has not been previously submitted in the form of an abstract, as part of a published lecture or academic thesis, or as an electronic preprint. Generative AI and AI-assisted technology were not used.

Competing interests The authors declare no competing interests.

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